

zadara

zStorage VPSA Object Storage

Release 21.07

Zadara

Apr 12, 2022

CONTENTS

1	Introduction	1
2	Getting Started	9
3	Provisioning your Object Storage	19
4	Understanding the VPSA Object Storage Dashboard	33
5	Resources Management	35
6	Accounts and Users Management	49
7	Managing Permissions	67
8	Usage Reports	69
9	VPSA Object Storage Logs	71
10	Performance Monitoring	73
11	VPSA Object Storage Console	77
12	VPSA Object Storage Settings	83
13	VPSA Object Storage Network Diagnostics	91
14	Object Storage Clients - Configuration	93
15	Load Balancer	101
16	Appendix B: Large Object Support	107
17	Appendix C: Object Storage Immutability (S3 Object Lock)	109

INTRODUCTION

1.1 What is Object Storage?

Object Storage is an alternative way to store, organize and access units of data. It provides a reasonable balance between performance and functionality versus simplicity and scalability. Object Storage enables a minimal set of features: store, retrieve, copy, and delete objects. These basic operations are done via REST APIs that allow programmers to work with the objects. The HTTP interface to Object Storage systems allows fast and easy access to the data for users from anywhere in the world.

1.2 Object Storage vs. Block and File Storage

Object Storage is much more scalable than file storage because it is vastly simpler. Objects are not organized in hierarchical folders, but in a flat organization of containers or buckets. Each object is assigned a unique ID or key. Their keys, regardless of where the objects are stored, retrieve objects. Access is via APIs at the application level, rather than via OS at the file system level. As a result, Object Storage requires less metadata, and less management overhead than file systems. This means Object Storage can be scaled out with almost no limits. Object Storage is easier to use than block storage and overcomes the limitation of fixed size LUNs. It also removes file system limitations such as the folder size or path name length. Unlike block or file, Object Storage does not use RAID for data protection. It simply keeps a number of copies of each object.

VPSA Object Storage is Zadara's object storage service. It is provided on Zadara clouds, side by side with the VPSA that provides block and file storage services.

1.3 VPSA Object Storage Components

1.3.1 Provisioning Portal

The Zadara Provisioning Portal is your gateway to the Zadara Storage ecosystem through which you can create, view, and modify your VPSA configurations on multiple Clouds that Zadara Storage offers.

1.3.2 Virtual Controller

A Virtual Controller (VC) is a Virtual Machine with dedicated CPUs & RAM, which runs the VPSA Object Storage IO stack and control stack. The number of VCs in a configuration is determined by the number of drives assigned, starting with a minimal configuration of 2 VCs, and can grow to hundreds. Each VC supports up to 12 drives. VCs are automatically provisioned as needed.

There are 2 services running in each VC: Proxy Layer and Storage Layer. The Proxy Layer is the interface to the users or the application using the data objects. The storage Layer is responsible for storing the objects on the drives, and updating the metadata in the databases.

The VCs also provide a web management interface and REST API endpoints for management and control, as well as authentication and load balancing services.

1.3.3 Dedicated Drives

The Zadara Storage Cloud Orchestrator assigns dedicated drives for each VPSA. The drives are provisioned from different Storage Nodes (SNs) for maximum redundancy and performance. Each drive is exposed as a separate iSCSI target from the SN and is LUN masked only to the VPSA's VCs. Your QoS is guaranteed, because neighbors, with provisioned drives adjacent to yours, cannot access your drives, impact your performance, or compromise your privacy and security.

1.4 VPSA Object Storage Profiles

Zadara have predefined three Object Storage Profiles, a profile should be chosen according to the required usable capacity and the required Data Protection Policy.

Each Data Policy type has a unique set of characteristics in terms of performance, durability and scale, consider the guidelines when you plan your new VPSA Object Storage layout.

Display Name	Performance	Recommended Scale	Fd	Utilization
2-Way Mirror	High	Up To 1 Pib Of Usable Capacity	2	50%
2+1 Erasure Coding	High	Up To 1 Pib Of Usable Capacity	3	67%
4+2 Erasure Coding	Moderate	Up To 4 Pib Of Usable Capacity	3	67%
6+2 Erasure Coding	Low-Moderate	Up To 4 Pib Of Usable Capacity	4	75%
9+3 Erasure Coding	Low	4 Pib Of Usable Capacity And Higher	4	75%

In the table below you will find the main differences between the Object Storage profiles.

Table 1: Object Storage Profiles

	Standard	Premium	Premium Plus
Max Usable Capacity (TiB)	1,024	4,096	61,440
Min Drives per Object Storage	4	24	48
Load Balancer	Internal	Internal	Elastic LB (ZELB)

Table 2: Object Storage Data Protection Policies

	Standard	Premium	Premium Plus
Erasure Coding Support	x	✓	✓
2 Way Mirror (2 Fault Domains)	✓	✓	✓
Erasure Coding 2+1 (3 Fault Domains)	x	✓	✓
Erasure Coding 4+2 (3 Fault Domains)	x	✓	✓
Erasure Coding 6+2 (4 Fault Domains)	x	✓	✓
Erasure Coding 9+3 (4 Fault Domains)	x	✓	✓
MZ 2 Way Mirror (2 Fault Domains)	x	✓	✓
MZ Erasure Coding 2+1 (3 Fault Domains)	x	✓	✓
MZ Erasure Coding 4+2 (3 Fault Domains)	x	✓	✓
MZ Erasure Coding 6+2 (4 Fault Domains)	x	✓	✓
MZ Erasure Coding 9+3 (4 Fault Domains)	x	✓	✓

✓ **Note:** The availability of Data Protection policies may differ in different Zadara deployment, as it is dependent on the amount of nodes the cloud is structured from.

Table 3: Minimal drives required for Data Policy creation

	Standard	Premium	Premium Plus
2 Way Mirror	4	24	48
Erasure Coding 2+1	x	36	72
Erasure Coding 4+2	x	36	72
Erasure Coding 6+2	x	48	96
Erasure Coding 9+3	x	48	96
Multizone 2 Way Mirror	x	48	96
Multizone Erasure Coding 2+1	x	72	144
Multizone Erasure Coding 4+2	x	72	144
Multizone Erasure Coding 6+2	x	96	192
Multizone Erasure Coding 9+3	x	96	192

Table 4: Minimal drives required for Data Policy Expansion

	Standard	Premium	Premium Plus
2 Way Mirror	2	2	24
Erasure Coding 2+1	x	3	36
Erasure Coding 4+2	x	6	36
Erasure Coding 6+2	x	8	48
Erasure Coding 9+3	x	12	48
Multizone 2 Way Mirror	x	4	48
Multizone Erasure Coding 2+1	x	6	72
Multizone Erasure Coding 4+2	x	12	72
Multizone Erasure Coding 6+2	x	16	96
Multizone Erasure Coding 9+3	x	24	96

Standard Object Storage profile For general purpose workloads and low capacity (up to 1PB of usable capacity at creation time).

Premium Object Storage For intermediate deployments and workload (up to 4PB of usable capacity at creation time) and extended data policy protection (including Erasure Coding). Zadara have created a dedicated profile in order to allow a structured deployment with additional allocated resources. The Premium Object Storage is structured from:

1. Dedicated Controllers - a pair of Virtual Controller that manages the Object Storage Ring, it will not perform any Proxy or Storage operations.
2. Proxy+Storage Virtual Controllers with extended resources to manage high volume of client connections and Object Storage operations.

Premium Plus Object Storage For high scale deployments, up to 60 PB of usable capacity at creation time, Along with extended Data Protection offering the Premium Plus Object Storage is structured from:

1. Dedicated Controllers - a pair of Virtual Controller that manages the Object Storage Ring, it will not perform any Proxy or Storage operations.
2. Zadara Elastic Load Balancer (ZELB) - will be created by default.
3. Proxy+Storage Virtual Controllers with extended resources to manage high volume of client connections and Object Storage operations.

✓ **Note:** Currently, Changing the VPSA Object Storage profile post creation is not supported.

1.5 VPSA Object Storage Administration

1.5.1 VPSA Object Storage Hierarchy

The Object Storage system organizes data in a hierarchy, as follows:

- **Account** (also referred to as Tenant). Represents the top-level of the hierarchy. Usually created by the service provider. The account admin owns all resources in that account. The account defines a namespace for containers. Containers in two different accounts, might have the same name. Accounts are also used to control users access to objects and containers.
- **Container** (Also referred to as Bucket). Defines a namespace for objects. Objects in two different containers, may have the same name. Any number of containers can be created within an account. In addition to containing objects, you can also use the container to control access to objects, and you can set a storage policy that each container uses.
- **Object**. Stores data content, such as documents, images, and so on.

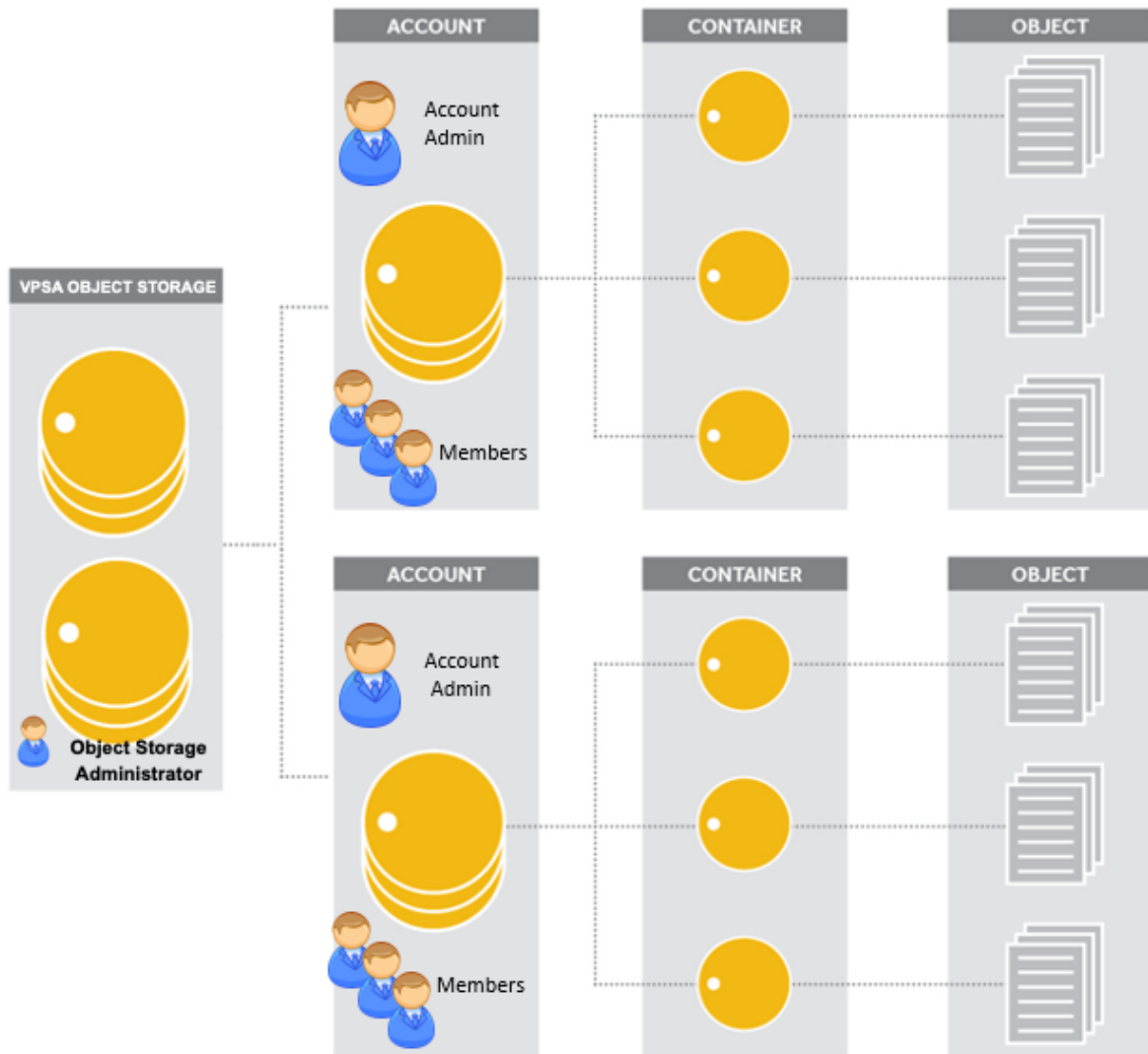
1.5.2 VPSA Object Storage Users and Roles

There are four types of Roles assigned to VPSA Object Storage Users:

- **VPSA Object Storage Administrator** (zios_admin) responsible for the administration of the VPSA Object Storage. The user (registered in Zadara Provisioning Portal) that orders the VPSA Object Storage becomes its Administrator. By default, the VPSA Object Storage is created with one account (administrator account) and the VPSA Object Storage Administrator is a member of this account. VPSA Object Storage Administrators can add other users with the same role. VPSA Object Storage Administrator is a super-user with privileges to create accounts and users of any role. Users with VPSA Object Storage Administrator role can define policies, add/ remove drives and assign drives to policies. Users with the VPSA Object Storage Administrator role can perform containers and objects operations across accounts. The VPSA Object Storage administrator is also responsible for the VPSA Object Storage settings (like IP addresses, SSL certification, etc.), and has access to the metering and usage information.
- **VPSA Object Storage Administrator (zios_admin) - Read Only** a dedicated Read-Only account for cross-accounts monitoring and reporting purposes. The Read-Only role is available for the zios_admin account only. A Read-Only user will have access to the VPSA Object Storage RestAPI, however it will not have data access. The user role is designated for monitoring and reporting purposes, such as:

- Performance monitoring
 - Capacity monitoring
 - Usage reports & billing automation
- **Account Admin** can create an account (using the Self Account Creation Wizard) and can manage their own accounts. They can perform any user management and containers/objects operations.
 - **Member** can do object storage operations according to the permission given by the account administrator, within the limits of that account. These operations include create/delete/list containers and create/delete/list objects.

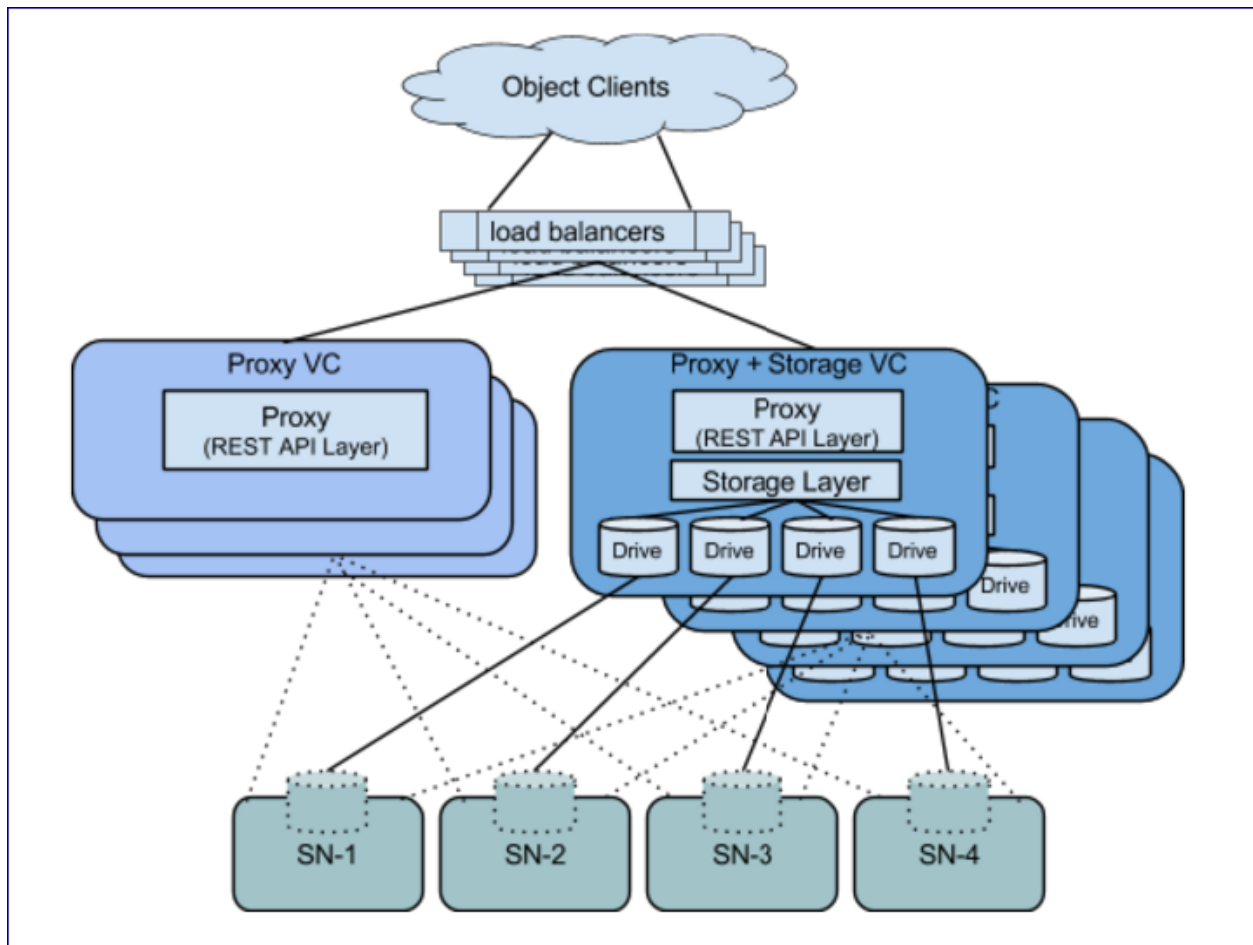
User authentication is done against an internal VPSA Object Storage Users database.



1.6 VPSA Object Storage Architecture

VPSA Object Storage architecture is a scale out cluster of Virtual Controllers that together provides the service. The number Of VCs is automatically determined as needed to serve the capacity and performance of the system.

1.6.1 VPSA Object Storage Structure



This figure shows high level logical view of VPSA Object Storage. It is a Virtual Object Store cluster, with two distinct layers:

- “Storage Layer” that manages individual disks
- “Proxy - REST API Layer” that provides REST API front-end of the Object Storage.

The typical VC runs both functions and is referred to as “Proxy+Storage” VC. It is possible to add VCs with the Proxy layer only. There are referred to as “Proxy” VC.

Each VPSA Object Storage is typically composed of several Proxy+Storage VCs and optionally one or more Proxy VCs with each VC having dedicated CPU/RAM/networking. Proxy+Storage VCs consume raw Physical drives (like SAS/SATA/SSD) exposed from Storage Nodes (SNs). Proxy+Storage and Proxy VCs run Object Storage Stack that provide Amazon S3 and Swift REST API interface.

Capacity & Performance can independently scaled up/down by adding/removing disks and proxy-VCs respectively. VPSA Object Storage typically has a set of load-balancers to distribute REST API traffic across the Proxy REST API Layers.

Each VPSA Object Storage natively being multi-tenant allows creation of multiple accounts within it, with each account having multiple users who can work with the object interface (GET/PUT objects).

A single Zadara Storage Cloud can host several virtual object stores and this makes it truly disruptive and unique, as each VPSA Object Storage has entirely provisioned resources of CPU/RAM/networking/disks & runs the object stack in isolated Virtual Machines (i.e. there is no sharing of resources anywhere across VPSAs) thereby providing complete performance and fault isolation.

1.6.2 Virtual Controller

VPSA Object Storage Virtual Controller (VC) provides multi-tenant, protected object storage.

Virtual Controller Responsibilities:

- Query Cloud Controller and Storage Nodes for resource assignments and changes.
- Provide data protection for objects - 2-way protection & Erasure Coding protection with objects distributed across multiple SN's disks
- Provide Authentication/Authorization framework with which individual accounts/users can be managed and these account/users being able to work with objects within their account
- Provide Amazon S3 and Swift APIs on object front-end with support for internal & external HTTPS termination
- Provides capability to scale up/down capacity with addition/removal of drives with corresponding automatic addition/removal of proxy+storage VCs
- Provide capability to scale REST API performance with addition/removal of proxy-VCs
- Automatically reconfigure/redistribute object data across available disks on addition/removal of disks, failure/recovery
- Provide management GUI and REST API to manipulate the system entities and also to work with the object store
- Provide metering visibility in object request flows, capacity trend utilization
- Billing based on capacity/throughput usage for each of the tenants
- Provide internal load balancing service
- Provide HA architecture for VC failure resiliency

1.6.3 The Ring

A ring represents a mapping between the names of entities stored on disk and their physical location. There are separate rings for accounts, containers, and one object ring per storage policy. When any components need to perform any operation on an object, container, or account, they need to interact with the appropriate ring to determine its location in the cluster.

The objects rings are stores in each Policy. The accounts and containers rings are stored in dedicated Policy named Metadata Policy.

One of the Virtual controllers (called Ring Master), runs the Rings, in addition to its other responsibilities. In case of failure of the Ring Master, another VC (called Ring Slave) will take its place.

1.6.4 VPSA Object Storage Fault Domains

In order to ensure the Object Storage survival in case a complete storage node is lost, the data is distributed between Fault Domains. “Object Storage Fault Domains” are manually populated for the cloud Storage Nodes by the cloud admin.

Object Storage VCs are created in “VC-Sets” according to the desired policy protection type (2-way/Erasure Coding protection). Each VC in a Set is created in a different Fault Domain.

Drives are added to the the Object Storage in sets as well. And allocated only to VCs within the same Fault Domain.

GETTING STARTED

This chapter contains step-by-step instructions to both create a VPSA Object Storage and then to configure its storage properties

2.1 Register a Zadara Account

To register for a new Zadara account, go to <https://manage.zadarastorage.com/register/> and complete the registration form.

2.1.1 Creating a VPSA Object Storage

1. Log on to your **Zadara Provisioning Portal** at <https://manage.zadarastorage.com>, or at your private cloud, using your username/email & password.

✓ **Note:** It is recommended to enable MFA (Multi-Factor Authentication) in order to add an additional layer of security to your account.

2. Click **Create Cloud Service**.
3. Select Zadara Cloud Service or Public Cloud Service. Click **Next**.
4. Select Location. Click **Next**. The **Create new VPSA Object Storage** wizard will open. The wizard has 4 steps: **Service, Name, Engines and Drives**, and **Review**. Wizard progress is shown as the top of the view.
5. In step **Service**, select **Object Storage**. Click **Next**.

Create new VPSA® Object Storage

Service Name Engine and Drives Review **wizard steps**

Creating a new Virtual Private Object Storage takes just a few minutes. Please provide the information requested at each step and watch as your VPSA takes shape in the right-hand column.

Compute Cloud

Compute Account

Storage Services

Storage Array Flash Array **Object Storage**

Object Storage Account

This service could be provisioned with a 5 days lead time

Back Next

Your Configuration

Location
Ireland

Site
IE - Dublin - Eircom - EIR1

Product
Object Storage

Description
A virtual object storage that support both HDD and SSD, offering S3 and Swift compatible Object Storage with private and dedicated resources.

- Completely isolated resources ensuring both privacy and a consistent quality of service (QoS) that will not be impacted by other storage instances.
- High Availability with a 100% uptime SLA, remote replication, and backup to object storage.

6. In step **Name**, enter the following fields:

- **VPSA Name** - give the Object Store a name. This is how it will appear in the Cloud Console and in the GUI. If you are planning on having multiple VPSA Object Storage configurations, you might want to give it as detailed a name as possible.

✓ **Note:** Name should contain only letters, numbers, and underscores, and cannot contain spaces.

- **VPSA Description** - free text description.
- **Object Storage Profile** - select Standard/Premium/Premium Plus. For additional information about the VPSA Object Storage profiles, see [VPSA Object Storage Profiles](#)

7. Click **Next**.

8. In step **Engines and Drives**, enter the following:

- **Redundancy Level supported**

Single zone VPSA Object Storage

- 2-Way Protection
- Erasure-Coding 2+1 or 4+2 (using 3 Fault Domains), 6+2 or 9+3 (using 4 Fault Domains)

Multizone HA VPSA Object Storage - all the above policies support MZ deployment.

Please refer to [VPSA Object Storage Profiles](#) for additional information and requirements regarding Object Storage Data policies.

With 2-way redundancy, 2 copies of each object are maintained. Erasure coding protection is done in 2+1 and 4+2 configuration and requires 50% extra capacity for redundancy. 6+2 or 9+3 configuration requires

33% extra capacity for redundancy.

- **Drive Quantities** - select the type and number of Drives that you would like to allocated to your VPSA Object Storage.
 - The Zadara Cloud orchestrator allocates dedicated drives.
 - Drives are allocated from as many different Storage Nodes as possible to provide max redundancy and availability.
 - The number of drives that can be selected depends on the protection level required.
 - * For 2-way protection, 4 - 24 drives can be added to the system in one operation.
 - * For erasure coding, 3 - 48 drives can be added to the system in one operation.
 - * For 2-way protection, an even number of drives must be selected.
 - * For Erasure Coding protection the number of drives must be divisible by the EC redundancy policy (e.g. for 4+2 protection, the number of drives must be divisible by 6).

9. Click **Next**.

10. In step **Review**, you can review all the configured information. To change anything, click **Back** and return to the desires step and correct as needed. Once everything is OK, click **Create**.

Create new VPSA® Object Storage

Type Edit	
Object Storage	
Name and Location Edit	
VPSA Name	Location
object_storage_test	Ireland
Site	
IE - Dublin - Eircom - EIR1	
Drives Edit	
Drive Quantities	Storage Policy
6 x 10000GB (9313GiB) HDD	2 Way Protection
6 x 3840GB (3576GiB) SSD	

\$5.70 Calculated VPSA Price Per Hour

[Back](#) [Create](#)

Next Steps ✕

After you've created your VPSA, our operations team will perform a quick review of your custom configuration and contact you to schedule an onboarding.

If you have any questions about provisioning your VPSA or the onboarding process, please contact our world-class support team.

Email support@zadarastorage.com

Phone 1-949-284-0713

11. The requested Object Storage, will appear in the “Awaiting Approval” list until approved by a Zadara Storage Cloud admin.
12. Once approved, the new system only takes a few minutes to launch. During that time the Object Storage status will be changes to “Launching”.
13. Once ready, you'll receive an email with a temporary password to the registered email address.

14. The VPSA Object Storage web management interface is accessible using the Management URL displayed in the portal.
15. Use your registered username or email address, and the temporary password, to enter the management interface. You will be immediately prompted to set a new password for your VPSA Object Storage Admin account.

✓ **Note:** It is recommended to enable MFA (Multi-Factor Authentication) in order to add an additional layer of security to your account.

Congratulations! You have successfully created and provisioned new VPSA Object Storage.

The newly created VPSA Object Storage already has a single account named “zios_admin”, and you are the only user defined “admin” with the role of “VPSA Object Storage Admin”. You can now manage your VPSA Object Storage - create containers and start uploading objects, or create additional accounts and users for others to use.

2.1.2 Creating an Object Storage Account

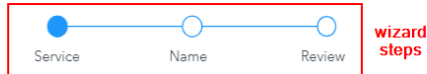
1. Log on to your **Zadara Provisioning Portal** at <https://manage.zadarastorage.com>, or at your private cloud, using your username/email & password.

✓ **Note:** This example uses the Zadara Storage provisioning portal <https://manage.zadarastorage.com>. In case you have your own Zadara Cloud deployment, replace the example URL with your own URL or IP address of your Provisioning Portal.

✓ **Note:** It is recommended to enable MFA (Multi-Factor Authentication) in order to add an additional layer of security to your account.

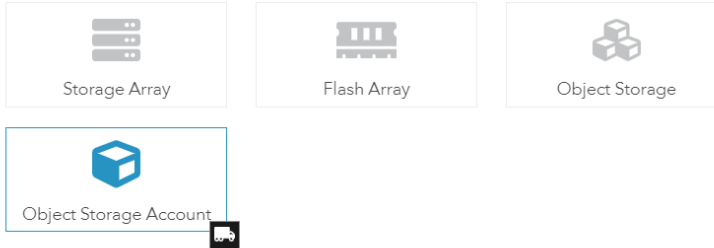
2. Click **Create Cloud Service**.
3. Select Zadara Cloud Service or Public Cloud Service. Click **Next**.
4. Select Location. Click **Next**. The **Create new VPSA Object Storage** wizard will open. The wizard has 3 steps: **Service**, **Name**, and **Review**. Wizard progress is shown as the top of the view.
5. In step **Service**, select **Object Storage Account**. Click **Next**.


Create new Public Object Storage Account



Creating a new Object Storage Account takes just a few minutes. Please provide the information requested at each step and watch as your VPSA takes shape in the right-hand column.

Storage Services



 This service could be provisioned with a 5 days lead time

[Back](#) [Next](#)

Your Configuration ✕

Location
Ireland

Site
IE - Dublin

Product
Object Storage Account

Description
A public and dedicated object storage account, instantly available on one of Zadara's public sites. Offering an S3 and Swift compatible enterprise grade Object Storage

High Availability with a 100% uptime SLA

\$0.00

GB/Month

6. In step **Name**, enter the following fields:

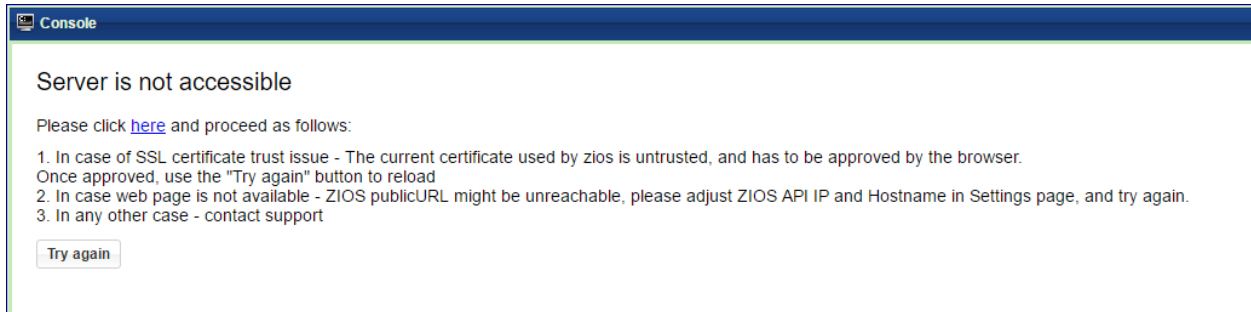
- **Account Name**
- **Administrator User Name**
- **Password** and confirmation

7. Click **Next**.

8. In step **Review**, you can review all the configured information. To change anything, click **Back** and return to the desired step and correct as needed. Once everything is OK, click **Create**.

2.1.3 Troubleshooting Access Issues

When opening the console for the first time after changing the default settings, you might get the following error message, as a result of wrong network configuration, or lack of SSL certification trust. Follow the instruction to fix the situation.



2.2 Understanding the VPSA Object Storage User Interface

The web management interface changes according to the context of the user that logs in. The User's Role determines the actions, available for each specific user.

2.2.1 Management Interface as seen by the VPSA Object Storage Administrator

The web management interface as seen by the VPSA Object Storage (**zios_admin**) account users includes the following:

- Dashboard
- Resources Management (Drives, Policies, Reports, VPSA Object Storage Console)
- System Settings
- Accounts Management (Accounts, Users, Roles, Requests)
- Logs (Access Log, Event Log)

Drives

Name	Capacity	Type	Status	Storage Node	Virtual Controller	Storage Policy	Fault Domain	Protection Zone
drive-000	9313 GiB	SAS	Normal	qs14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-008	9313 GiB	SAS	Normal	qs14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-016	9313 GiB	SAS	Normal	qs14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-024	9313 GiB	SAS	Normal	qs14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-032	9313 GiB	SAS	Normal	qs14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-040	9313 GiB	SAS	Normal	qs14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-048	9313 GiB	SAS	Normal	qs14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-056	9313 GiB	SAS	Normal	qs14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-064	9313 GiB	SAS	Normal	qs14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-072	9313 GiB	SAS	Normal	qs14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone

Details for drive-000

Properties

- ID: volume-0000099e
- Name: drive-000
- Capacity: 9313 GiB
- Storage Node: qs14-sn1
- Virtual Controller: vc-1
- Storage Policy: 9-3-EC-MZ-HA
- Fault Domain: 1
- Protection Zone: Primary_Protection_Zone
- Type: SAS
- UUID: 50000CA2674E1CFC
- Status: Normal
- Added: 2019-09-25 06:39:51
- Modified: 2019-09-26 08:33:47

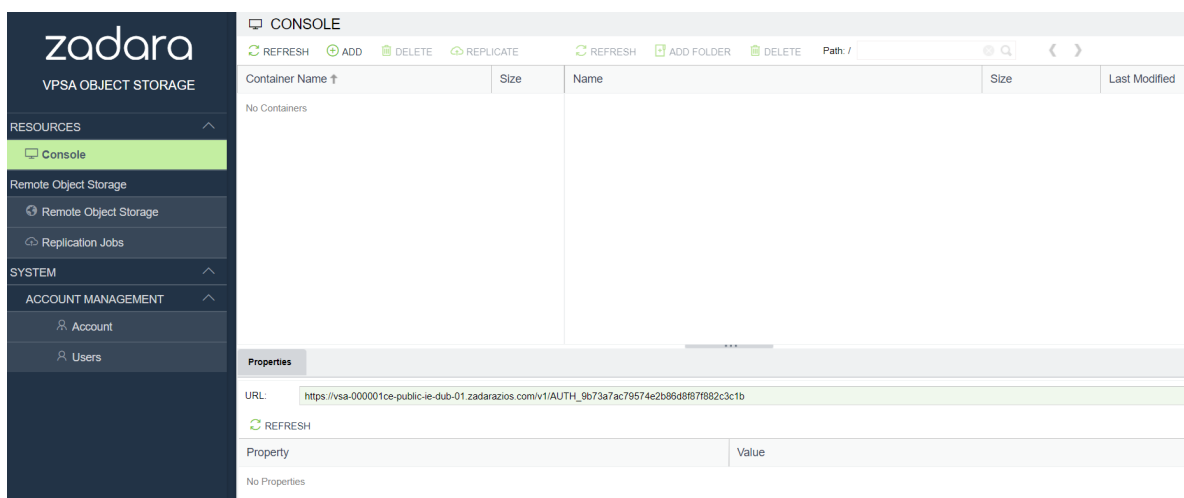
The VPSA Object Storage web management interface provides full management capabilities and control of your VPSA Object Storage, for the VPSA Object Storage Admins. It provides full management and control of the Account level to the Account admins. It contains the following main components (as numbered in the above screenshot):

1. **Main Navigation Left Panel** – traverse through the various entities. The selected entity is highlighted.
2. **The Center Pane** – displays a list of objects from the selected entity type (e.g. drives in the above screenshot example), and for each object it displays its main properties.
3. **The South Pane** – displays detailed information regarding the selected object. All objects have at least 2 tabs:
 - **Properties** – detailed properties of the object selected.
 - **Metering** – typically IO workload metering info.
 - **Related Objects** – lists of other objects related to the selected object.
4. **Logged-in user** – displayed at the upper right corner. Clicking this link opens the user’s information screen as described under the [User Information](#) (Managing Users section).
5. **Selected Language** – displayed at the top right corner. You can use this drop down to change the displayed language. Available display languages are:
 - English
 - Japanese
 - Korean
 - Deutsche
 - Portuguese

2.2.2 Management Interface as seen by Account admin

The web management interface as seen by the **Account admin** account users includes the following views:

- VPSA Object Storage Console - In this view, you can create/delete and view containers and folders, and perform other functions, to help organize and manage the storage objects. For more information, see [The VPSA Object Storage Console Window](#).



- Replication Jobs

- Account Management - In this view, you can view/configure account properties, permissions, and storage usage, and see lists of users associated with the account. For more information, see [Managing Accounts](#).

User	List Containers	Create/Delete Containers	Read Objects	Write/Delete Objects
All Members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Users Management - In this view, you can create/delete/enable/disable users. You can reset user passwords and see their usage statistics. You can see user properties and perform other user-level management functions. For more information, see [Managing Users](#).

Name	Email	ID	Enabled	Dual Factor Authentication	Role	Account	Locked
josh	josh@xxx.com	fa3534d9db5f4110bf4c0...	Yes	No	Account Admin	public_OSA_58	No

Account Member logged in user will have the VPSA Object Storage Console view only.

PROVISIONING YOUR OBJECT STORAGE

You create, delete, and manage the resources composing your VPSA Object Storage via Zadara's **Provisioning Portal**.

This section describes the available operations in the Provisioning Portal (<https://manage.zadarastorage.com>).

3.1 Adding Drives to an Existing Storage Policy (VPSA Object Storage Admin)

To add Drives to your VPSA Object Storage, go to the Zadara Provisioning Portal, select the VPSA Object Storage, and then press the Add Storage link.

The screenshot displays the Zadara Provisioning Portal interface. A modal dialog titled "Add Storage to ZOBS" is open, allowing the user to configure storage additions. The dialog includes a dropdown for "Please select the destination policy" set to "2-Way-Protection (2 Way Protection)". Below, "Select drive quantities" shows two rows: "10" for "6000GB (5588GiB) Repository 6TB SATA (\$0/hr)" and "0" for "3800GB (3576GiB) 3.8TB SSD (\$0/hr)". "Cancel" and "Add" buttons are at the bottom right of the dialog. The background shows the portal's main content area with a table of storage policies and a "Zadara-On-Premise" section.

Name	Type
PRIMARY	Storage Array
ZOBS	Object Storage

ZOBS

Zadara-On-Premise

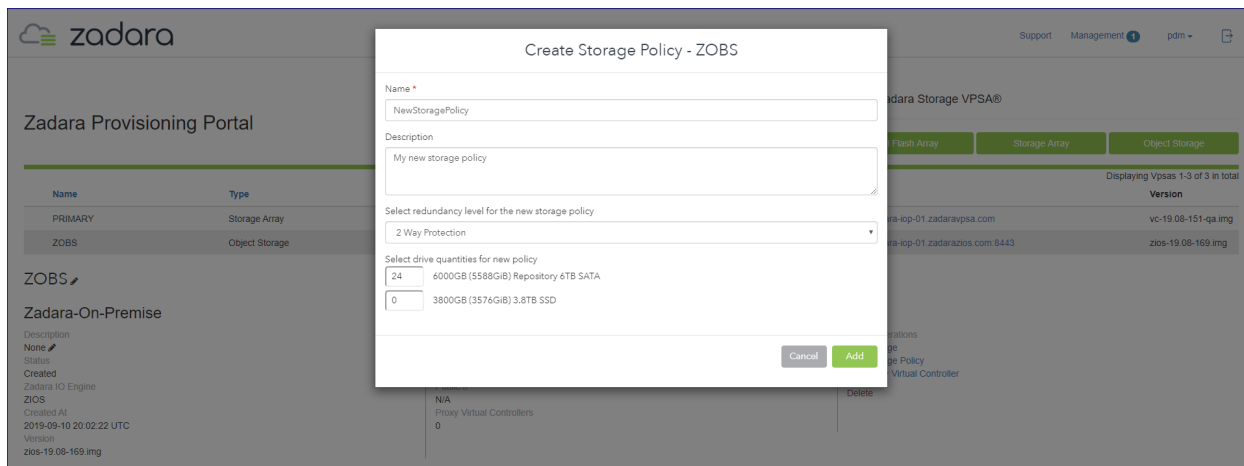
Description None	Primary Management Interface URL: https://vsa-0000012-zadara-lop-01.zadara.com/8443 IPv4: 172.49.224.105 IPv6: N/A Public IP: N/A Proxy Virtual Controllers: 0	VPSA Operations Add Storage Add Storage Policy Add Proxy Virtual Controller Delete
---------------------	---	--

- Select the Storage Policy for which you add the drives
- Select the number of Drives of the relevant type you wish to add to your VPSA Object Storage, and press Add. The number of drives added to the "Storage Policy" should match its characteristics, as described in the Getting Started section of this guide.
- This operation requires the approval of a Zadara Storage Cloud Admin. Once approved, you'll see the number of Drives in the Provisioning portal updated according to the request. The new drives will be automatically assigned to the selected Storage policy.

✓ **Note:** Drives can't be added more frequently than every 8 hours to let the Storage Policy to re-balance.

3.2 Adding Storage Policy (VPSA Object Storage Admin)

To add Storage policy to your VPSA Object Storage, go to the Zadara Provisioning Portal, select the VPSA Object Storage, and then press the Add Storage Policy link.



- Give the new Policy a name and description.

✓ **Note:** Objects names can be up to 128 chars long and can contain letters and digits, dashes “-” and underscores “_”

- Select the protection level for this Storage Policy.
- Select the number of Drives of the relevant type you wish to assign to this Storage Policy, and press Add. The number of drives added to the “Storage Policy” should match its characteristics, as described in the Getting Started section of this guide.
- This operation requires the approval of a Zadara Storage Cloud Admin. Once approved, you’ll see the new Policy created in the VPSA Object Storage web management interface.

3.3 Assigning Public IPs (VPSA Object Storage Admin)

For security and privacy reasons, by default you cannot access the VPSA Object Storage from the public Internet. The Front-End IP address, used for management (via GUI and REST API) and for data IO workload (S3/Swift API), is allocated on the Zadara Storage Cloud “Front-End” network 10/40 GbE which is routable only from the Cloud Servers network. As this is an internal IP address, servers outside of your cloud network will not be able to reach this IP address. This means you cannot access your VPSA Object Storage from the Internet or any network with no routing to the Front-End network.

To assign a Public IP address to your VPSA Object Storage, for Internet inbound connectivity, open the Provisioning Portal, select the VPSA Object Storage, and click the Assign Public IP link. This operation requires Zadara Storage Cloud Admin approval. Once approved, the IP address will be added to the VPSA Object Storage characteristics. And In the VPSA Object Storage web management interface, under Settings > General > Public IP. To remove it, simply click the Remove Public IP link in the Zadara Provisioning Portal.

3.4 VPSA Object Storage In an Isolated Environment

VPSA Object Storage can be created in an isolated environment where no Internet access is available.

VPSA Object Storage includes SSL object web server in addition to the web management interface SSL server, therefore it is created with a default SSL certificate issued to zadara.com domain name.

In an isolated environment, there is no automatic DNS registration of the zadara.com domain name in DNSimple, hence the certificate will not match the FQDN of the VPSA Object Storage. In this case, you may encounter with the following behavior:

- Object operations, including backup from VPSA Storage Array to VPSA Object Storage, may fail (as the VPSA Object Storage certificate cannot be verified).
- VPSA Object Storage Console will not be available.
- Accounts will be created without permissions


There are two approaches to adjust the VPSA Object Storage within an isolated environment:

- Option 1 - Domain name for the FE interface (**Recommended**)
 - 1.a Use the default zadara.com domain name
 - 1.b Use a custom domain name
- Option 2 - IP address for the FE interface

3.4.1 Option 1.a: Default VPSA Object Storage Domain Name

Once VPSA Object Storage is created, proceed as following:

- Browse to the Management Interface IP address (as displayed in the provisioning portal), and approve the “insecure” certificate which does not match the URL IP:



Your connection is not private

Attackers might be trying to steal your information from **190.90.2.105** (for example, passwords, messages, or credit cards). NET::ERR_CERT_COMMON_NAME_INVALID

Automatically report details of possible security incidents to Google. [Privacy policy](#)

[HIDE ADVANCED](#) [Back to safety](#)

This server could not prove that it is **190.90.2.105**; its security certificate is from ***zadarazios.com**. This may be caused by a misconfiguration or an attacker intercepting your connection.

[Proceed to 190.90.2.105 \(unsafe\)](#)

- Login to the web management interface with initial credentials and follow the prompt to replace the initial password.
- Go to Settings page and copy the VPSA Object Storage API Hostname, which is the default domain name.

The screenshot shows the 'Settings' page with the 'General' tab selected. The configuration parameters are as follows:


Parameter	Value	Action
Public IP:	None	
API Endpoint:	https://vsa-00000331-...darazios.com:443	
Auth Endpoint:	https://vsa-00000331-...darazios.com:5000/v2.0	
ZIOS API IP:	190.90.2.105	Edit
ZIOS API Hostname:	vsa-00000331-...darazios.com	Edit
Upload SSL certificate:		Edit
SSL Termination:	Internal	Edit
ZIOS Floating FE IP:	1...105	
Proxy VCs IP:	1...100 1...102 1...103 1...104	

- Manually register the default domain name with VPSA Object Storage FE IP in your internal DNS server.
- Now, GUI connection and object operations should be done against the VPSA Object Storage default domain name which matches the name in the SSL certificate the VPSA is holding.

3.4.2 Option 1.b: Custom VPSA Object Storage Domain Name

Once VPSA Object Storage is created, proceed as following:

- Browse to VPSA Object Storage GUI IP (as appears in the provisioning portal), and approve the “insecure” certificate which is not matching the URL IP:



Your connection is not private

Attackers might be trying to steal your information from **190.90.2.105** (for example, passwords, messages, or credit cards). NET::ERR_CERT_COMMON_NAME_INVALID

Automatically report details of possible security incidents to Google. [Privacy policy](#)

[HIDE ADVANCED](#) [Back to safety](#)

This server could not prove that it is **190.90.2.105**; its security certificate is from ***.zadarazios.com**. This may be caused by a misconfiguration or an attacker intercepting your connection.

[Proceed to 190.90.2.105 \(unsafe\)](#)

- Login to the GUI with initial credentials and change password
- Go to Settings page and edit the VPSA Object Storage API Hostname, remove the default domain name and set a custom domain name as required:

Settings

General Security Pricing

General

Public IP: None

API Endpoint: https://190.90.2.105:443

Auth Endpoint: https://190.90.2.105:5000/v2.0

ZIOS API IP: 190.90.2.105 [Edit](#)

ZIOS API Hostname: [Close](#)

Upload SSL certificate: [Edit](#)

SSL Termination: Internal [Edit](#)

ZIOS Floating FE IP: 190.90.2.105

Proxy VCs IP: 190.90.2.100
190.90.2.102
190.90.2.103
190.90.2.104

- The GUI will be reloaded and you will need to re-login, once logged in you will see in the Settings page that the API and Auth Endpoints were changed to the custom domain name instead of the default one:

API Endpoint: https://custom-domain.com:443

Auth Endpoint: https://custom-domain.com:5000/v2.0

✓ **Note:** Starting that point, all mails sent to users by VPSA Object Storage will include URL with the custom domain name.

At this point VPSA Object Storage is still using “insecure” SSL certificate which was issued to zadarazios domain name. Although objects operations will now be possible, objects clients such as Cloudberry / S3browser will warn about an insecure connection to VPSA Object Storage. VPSA Storage Array backup to Object Storage will fail as it cannot handle insecure connections.

In order to complete the procedure and work in “secure” mode, you will need to:

- Manually register the custom domain name with the VPSA Object Storage FE IP in your internal DNS server.
- Generate SSL certificate issued to the custom domain name.
- Upload it to the VPSA Object Storage as a PEM file. Use the Settings page to upload the certificate:

General	
Public IP:	None
API Endpoint:	https://custom-domain.com:443
Auth Endpoint:	https://custom-domain.com:5000/v2.0
ZIOS API IP:	190.0.0.105 Edit
ZIOS API Hostname:	custom-domain.com Edit
Upload SSL certificate:	Edit
SSL Termination:	Internal Edit
ZIOS Floating FE IP:	190.0.0.105
Proxy VCs IP:	190.0.0.100 190.0.0.102 190.0.0.103 190.0.0.104

Once the new PEM is uploaded, the web management interface will reload. Now, GUI connection and object operations should be done against VPSA Object Storage custom domain name which is matching the name in the SSL certificate VPSA Object Storage is holding.

3.4.3 Option 2: IP Address

Once VPSA Object Storage is created, proceed as following:

- Browse to GUI IP (as appears in the provisioning portal), and approve the “insecure” certificate which is not matching the URL IP:



Your connection is not private

Attackers might be trying to steal your information from **190.90.2.105** (for example, passwords, messages, or credit cards). NET::ERR_CERT_COMMON_NAME_INVALID

Automatically report details of possible security incidents to Google. [Privacy policy](#)

HIDE ADVANCED

Back to safety

This server could not prove that it is **190.90.2.105**; its security certificate is from ***.zadarazios.com**. This may be caused by a misconfiguration or an attacker intercepting your connection.

[Proceed to 190.90.2.105 \(unsafe\)](#)

- Login to VPSA Object Storage GUI with initial credentials and change password
- Go to Settings page and edit the VPSA Object Storage API Hostname

General

Public IP:	None	
API Endpoint:	https://vsa-0000032c-...zadarazios.com:443	
Auth Endpoint:	https://vsa-0000032c-...zadarazios.com:5000/v2.0	
ZIOS API IP:	190.90.2.112	Edit
ZIOS API Hostname:	vsa-0000032c-...zadarazios.com	Edit
Upload SSL certificate:		Edit
SSL Termination:	Internal	Edit
ZIOS Floating FE IP:	190.90.2.112	
Proxy VCs IP:	190.90.2.100 190.90.2.103 190.90.2.108 190.90.2.102	

- Clear the value and save

[Close](#)

ZIOS API Hostname:

[Save](#)

- The GUI will be reloaded and you will need to re-login, once logged in you will see the API and Auth Endpoints were changed to include IP instead of domain name:

API Endpoint:	https://custom-domain.com:443
Auth Endpoint:	https://custom-domain.com:5000/v2.0

✓ **Note:** Starting that point, all mails sent to users by the VPSA Object Storage will include the IP-based URL instead of the domain name.

At this point the web server is still using the “insecure” SSL certificate which was issued to zadara.com domain name. Although objects operations will now be possible to VPSA Object Storage, objects clients such as Cloudberry \ S3browser will warn about an insecure connection to the VPSA Object Storage. VPSA Storage Array backup to VPSA Object Storage will fail as it cannot handle insecure connections.

In order to work in “secure” mode, you will need to:

- Generate SSL certificate issued to the VPSA Object Storage FE IP (it can be self-signed certificate).
- Upload it to the VPSA Object Storage as a PEM file . Use the Settings page to upload the certificate:

General

Public IP:	None	
API Endpoint:	https://custom-domain.com:443	
Auth Endpoint:	https://custom-domain.com:5000/v2.0	
ZIOS API IP:	190.0.0.105	Edit
ZIOS API Hostname:	custom-domain.com	Edit
Upload SSL certificate:		Edit
SSL Termination:	Internal	Edit
ZIOS Floating FE IP:	190.0.0.105	
Proxy VCs IP:	190.0.0.100 190.0.0.102 190.0.0.103 190.0.0.104	

Once the PEM is uploaded, GUI will reload. Now, GUI connection and object operations should be done against VPSA Object Storage FE IP which is matching the name in the SSL certificate VPSA Object Storage is holding.

3.5 Setting Custom Domain for VPSA Object Storage

VPSA Object Storage is created by default with zadara.com domain and registered with this domain name in DNSimple DNS service.

VPSA Object Storage includes SSL object server in addition to the GUI SSL server, therefore it is created with a default SSL certificate issued to zadara.com .

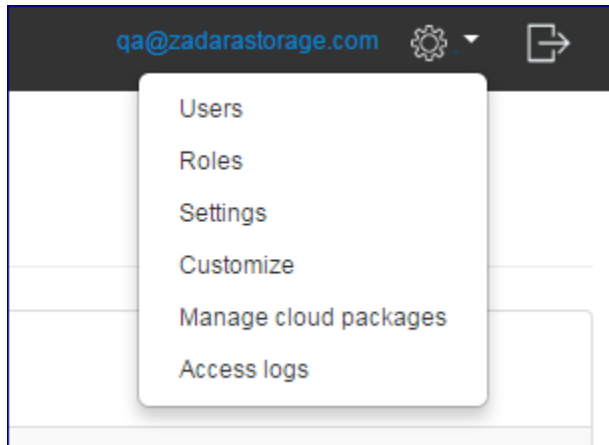
VPSA Object Storage domain name and certificate are not only used for management but also for Authentication and Object Operations.

Follow the procedure below to set a custom domain instead of the default:

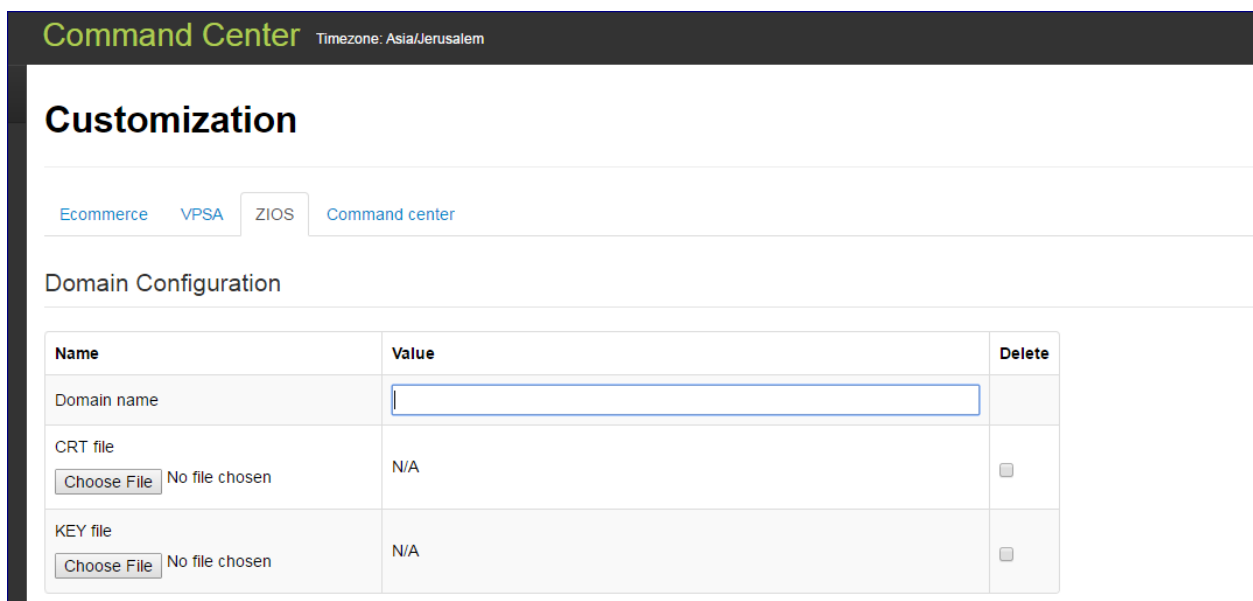
3.5.1 Global custom domain for all Object Storage VPSA's in the cloud

Similar to VPSA Storage Array, it is possible to customize the cloud via Command Center in order to make sure every VPSA Object Storage which is created on the cloud will own a custom domain name and a matching SSL certificate.

- Login to Command Center and open customization page:



- Under the General tab set a custom domain name, and upload a matching SSL certificate:



- From that point on, every VPSA Object Storage to be created in this cloud will have the custom domain name and matching certificate
- Manually register the custom domain of each VPSA in a public DNS server.

3.5.2 Explicit custom domain per VPSA Object Storage

Once VPSA Object Storage is created proceed as following:

- Browse to the management URL (zadarazios domain name) as appears in the provisioning portal
- Login to the GUI with initial credentials and change password
- Go to the Settings page and edit the VPSA Object Storage API Hostname, remove the default domain name and set a custom domain name as required:

The screenshot shows the 'Settings' page with the 'General' tab active. The 'ZIOS API IP' field is highlighted, and a modal dialog is open for editing the 'ZIOS API Hostname' to 'custom-domain.com'. Other fields like 'API Endpoint', 'Auth Endpoint', and 'ZIOS Floating FE IP' are visible.

- The GUI will be reloaded and you will need to re-login, once logged in you will see in the Settings page that the API and Auth Endpoints were changed to the custom domain name instead of the default one:

The screenshot shows the updated 'API Endpoint' and 'Auth Endpoint' fields. The 'API Endpoint' is now 'https://custom-domain.com:443' and the 'Auth Endpoint' is 'https://custom-domain.com:5000/v2.0'.

✓ **Note:** Starting that point, all mails sent to users will include URL with the custom domain name.

At this point the VPSA Object Storage is still using the default SSL certificate which was issued to zadarazios domain name. Although objects operations will now be possible, objects clients such as Cloudberry / S3browser will complain about an insecure connection to the VPSA Object Storage as the certificate is not matching the custom domain name. In addition VPSA backup to VPSA Object Storage will fail as it cannot handle insecure connections.

In order to work in “secure” mode, you will need to:

- Manually register the custom domain name with the VPSA Object Storage FE IP in any public DNS server. If a Public IP is required, assign a public IP to the VPSA Object Storage and register the custom domain name with the public IP in the DNS.
- Generate SSL certificate issued to the custom domain name
- Upload it to the VPSA Object Storage as a PEM file . Use the Settings page to upload the certificate:

Once PEM is uploaded, GUI will reload. Now, GUI connection and object operations should be done against VPSA Object Storage custom domain name which is matching the name in the SSL certificate VPSA Object Storage is holding.

✓ **Note:** The management URL will still appear in the provisioning portal with the default zadarazios domain name, however management, authentication and objects operations will be done against the custom domain as seen in the VPSA Object Storage settings page and which will also appear in mails.

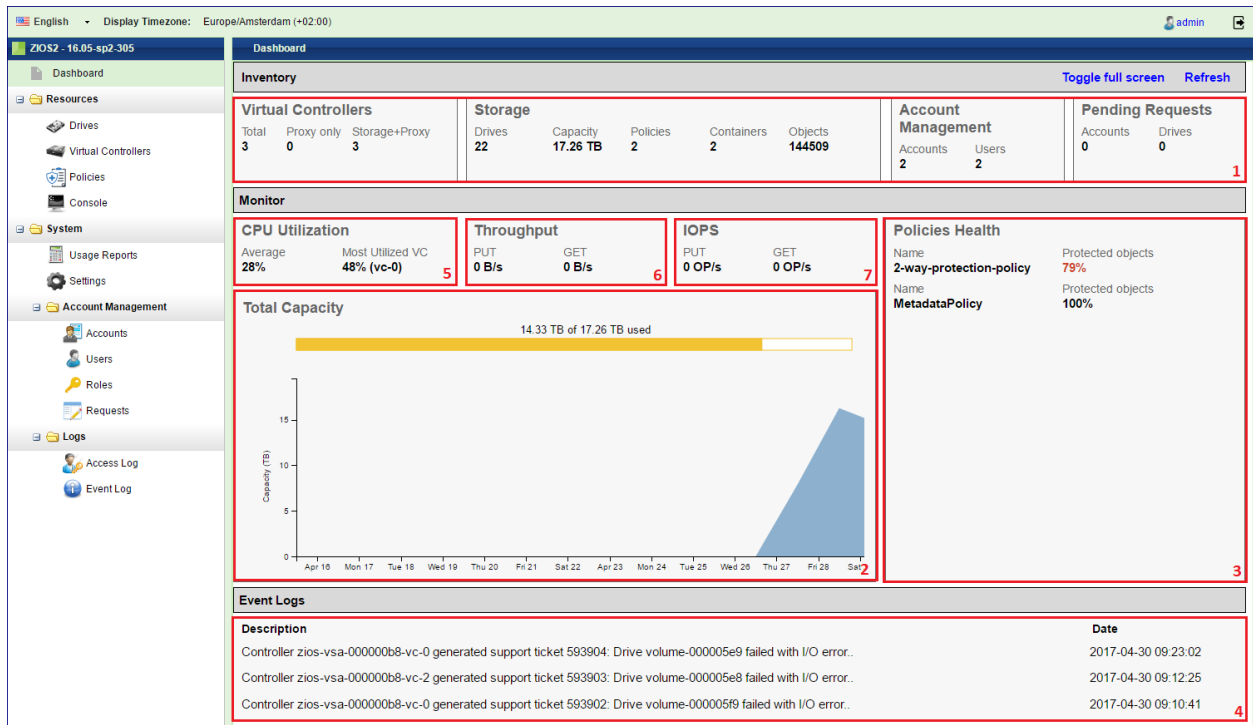
3.6 Adding Proxy Virtual Controllers (VPSA Object Storage Admin)

The public VPSA Object Storage REST API is exposed through the Proxy. For each request, it will look up the location of the account, container, or object and route the request accordingly. Failures are also handled in the Proxy. For example, if an object server is unavailable for an object PUT request, it will find an alternate route there instead.

In VPSA Object Storage every VC automatically assigned to the system has both Storage and Proxy roles. However, in order to improve performance, you have the option to add additional Proxy only VC's.

To assign additional Proxy VC's, go to the Zadara Provisioning Portal, select the VPSA Object Storage system, and press the Add Proxy Virtual Controllers button. This operation requires the approval of a Zadara Storage Cloud Admin.

UNDERSTANDING THE VPSA OBJECT STORAGE DASHBOARD



The VPSA Object Storage Dashboard allows administrators to get the overall health of the system at a glance. The dashboard is visible to the Object Storage administrator (zios_admin account) only.

1. **Inventory** – Lists the number of entities of each type currently defined in the VPSA Object Storage.
2. **Capacity Usage** – This chart shows the accumulated used capacity of all storage Policies over time. The bar shows the current used/free capacity.
3. **Policies Health** – Lists all storage policies with their health index as calculated by the system.
4. **Events** – Shows the top priority latest events that the admin must be aware of.
5. **CPU Usage** – Shows the average load on all Virtual Controller and the load on the most utilized Virtual Controller.
6. **Throughput** – Shows the current aggregated throughput of all objects Put/Get operations at the proxy level.
7. **IOPS** – Shows the current aggregated number of all objects Put/Get operations at the proxy level.

✓ **Note:** The VPSA management interface web application is supported in all modern browsers. We recommend using Google Chrome, Firefox or Microsoft Edge for an optimal user experience.

CHAPTER

FIVE

RESOURCES MANAGEMENT

5.1 Monitoring Drives

To monitor drives in your Object Storage system open the GUI > Resources > Drives

The screenshot shows the Object Storage GUI interface. The top navigation bar includes 'English', 'Display Timezone: Etc/UTC (+00:00)', and a 'pdm' logo. The left sidebar contains a navigation menu with categories: 'Resources' (Virtual Controllers, Load Balancer Groups, Policies, Console), 'System' (Usage Reports, Settings, Diagnostics), 'Account Management', and 'Logs'. The main content area is titled 'Drives' and features a 'Refresh' button. Below this is a table listing drives with columns for Name, Capacity, Type, Status, Storage Node, Virtual Controller, Storage Policy, Fault Domain, and Protection Zone. The table contains 11 rows of drive data. Below the table is a pagination control showing 'Page 1 of 1' and a refresh icon. The bottom section of the screenshot shows the 'Details for drive-000' view, which includes tabs for 'Properties', 'Disk Metering', and 'Backend Metering'. The 'Properties' tab is active, displaying a list of drive attributes such as ID, Name, Capacity, Storage Node, Virtual Controller, Storage Policy, Fault Domain, Protection Zone, Type, UUID, Status, Added, and Modified.

Name	Capacity	Type	Status	Storage Node	Virtual Controller	Storage Policy	Fault Domain	Protection Zone
drive-000	9313 GiB	SAS	Normal	qa14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-008	9313 GiB	SAS	Normal	qa14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-016	9313 GiB	SAS	Normal	qa14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-024	9313 GiB	SAS	Normal	qa14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-032	9313 GiB	SAS	Normal	qa14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-040	9313 GiB	SAS	Normal	qa14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-048	9313 GiB	SAS	Normal	qa14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-056	9313 GiB	SAS	Normal	qa14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone
drive-064	9313 GiB	SAS	Normal	qa14-sn1	vc-1	9-3-EC-MZ-HA	1	Primary_Protection_Zone

Details for drive-000

Properties | Disk Metering | Backend Metering

ID: volume-0000099e
Name: drive-000
Capacity: 9313 GiB
Storage Node: qa14-sn1
Virtual Controller: vc-1
Storage Policy: 9-3-EC-MZ-HA
Fault Domain: 1
Protection Zone: Primary_Protection_Zone
Type: SAS
UUID: 5000CA2674E1CFC
Status: Normal
Added: 2019-09-25 06:39:51
Modified: 2019-09-25 08:33:47

5.1.1 Viewing Drives Properties (VPSA Object Storage Admin)

The Drives details (properties and metering), are shown in the South Panel tabs:

Properties

Each Drive includes the following properties:

Property	Description
ID	An internally assigned unique ID
Name	Automatically assigned name.
Capacity	The Drive capacity in GiB
Storage Node	The Storage Node that contains the selected Drive
Virtual Controller	The virtual controller that owns the selected drives and performs IO operations on it
Storage Policy	The Storage Policy where the selected Drive belongs
Fault Domain	The Zadara cloud Fault Domain this Drive resides belongs to
Protection Zone	The Zadara cloud protection zone this drive is physically located at
Type	Drive type: SATA, SAS, SSD
UUID	The unique identifier of the drive
Status	<ul style="list-style-type: none"> • Normal – All drives are in sync • Failed – The drive does not function • Absent – The drive does not exist
Added	Date & time when the drive was added
Modified	Date & time when the drive was last modified

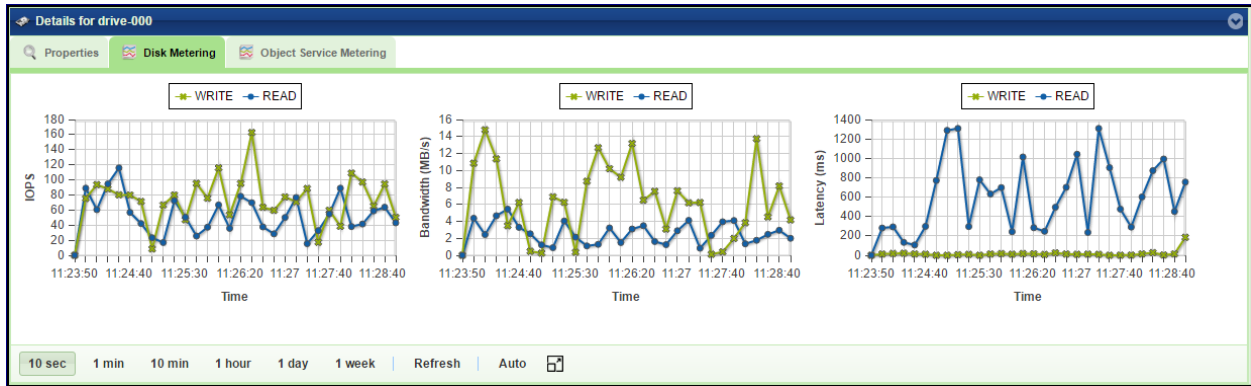
Disk Metering

The Metering Charts provide live metering of the IO workload associated with the selected Drive.

The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 second, 1 minute, 10 minutes, 1 hour, 1 day, 1 week. The Auto button lets you see continuously-update live metering info.

The following charts are displayed:

Chart	Description
IOPs	The number of read and write commands issued to the selected Drive per second
Bandwidth (MB/s)	Total throughput (in MB) of read and write commands issued to the selected Drive per second
Latency (ms)	Average response time of all read and write commands issued to the selected Drive per selected interval



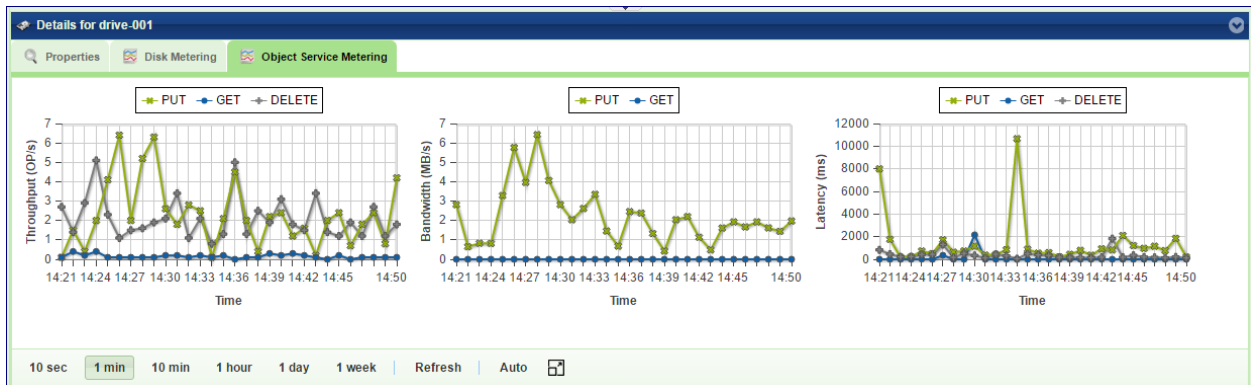
Backend Metering

The Metering Charts provide live metering of the IO workload on the selected Drive.

The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 second, 1 minute, 10 minutes, or 1 hour, 1 day, 1 week. The Auto button lets you see continuously-updating live metering info.

The following charts are displayed:

Chart	Description
Throughput (OP/s)	The number of operations (PUT/GET/DELETE) that were sent to the selected Drive per second
Bandwidth (MB/s)	Total throughput (in MB) of read and write commands that were sent to the selected Drive per second
Latency (ms)	Average response time of all operations (PUT/GET/DELETE) that were sent to the selected Drive per selected interval



5.2 Monitoring Virtual Controllers

Virtual Controllers are Virtual Machines (VM) on the Zadara cloud that serves client operations on the Object Storage. For a full list of the VC responsibilities refer to [Virtual Controller](#). Virtual Controllers are automatically created and added/removed to the Object Storage configuration, depending on the number of the allocated drives. There are minimum of two VCs in each VPSA Object Storage deployment: vc-0, vc-1. These VCs have role of Proxy+Storage. To improve performance you can add Proxy only VCs from the Zadara Provisioning Portal as described at [Adding Proxy Virtual Controllers \(VPSA Object Storage Admin\)](#).

5.2.1 Viewing VCs Properties (VPSA Object Storage Admin)

Properties

Each Virtual Controller has the following properties:

Property	Description
ID	An internally assigned unique ID
Storage Role	Proxy+Storage / Proxy-Only
Management Role	<ul style="list-style-type: none"> • Ring Master - Runs the Object Storage Rings • Ring Slave - Standby to run the Object Storage Rings • VC - Regular VPSA Object Storage VC
Status	<ul style="list-style-type: none"> • Created - VC is running normally • Failed - VC is not running • Passivating - VC is shutting down • Deleting - in the process of being removed from the cluster
Storage Node	The Storage Node hosting selected VC
Fault Domain	The Zadara cloud Fault Domain this VC resides belongs to
Protection Zone	The Zadara cloud protection zone this VC is allocated to
Frontend IP	The IPv4 or IPv6 address allocated to the VC
Backend IP	The VC IP address on the backend network that connects to the Drives
Load Balancer Group	(Optional) In case an ELB is enabled, represent the LB Group of the VC
Added	Date & time when the VC was added
Modified	Date & time when the VC was last modified

Drives

List the drives assigned to the selected Storage Policy.

System Usage

This chart shows the CPU utilization of the selected VC.

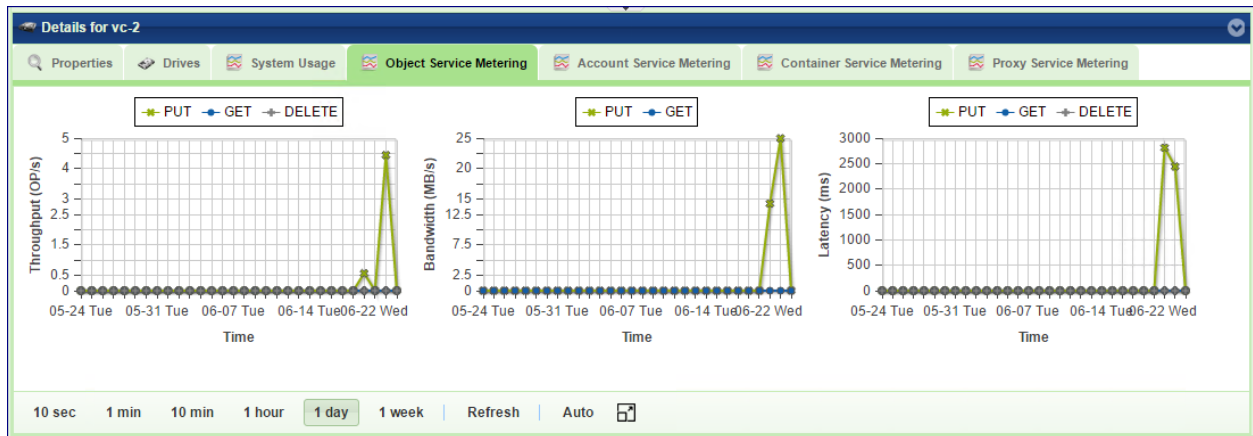
Backend Metering

The Metering Charts provide live metering of the IO workload at the backend of the selected VC.

The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 second, 1 minute, 10 minutes, or 1 hour, 1 day, 1 week. The Auto button lets you see continuously-updating live metering info.

The following charts are displayed:

Chart	Description
Throughput (OP/s)	The number of operations (PUT/GET/DELETE) issued to objects and handled by the selected VC per second
Bandwidth (MB/s)	Total throughput (in MB) of read and write commands issued by the selected VC per second
Latency (ms)	Average response time of all operations (PUT/GET/DELETE) issued to objects and handled by the selected VC per selected interval



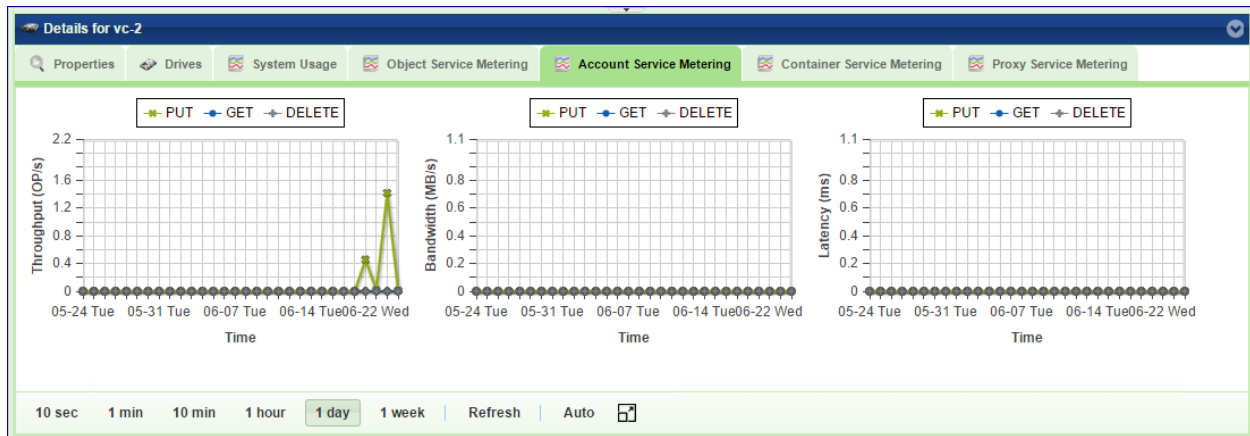
Account Service Metering

The Metering Charts provide live metering of the IO workload on the accounts database at the backend of the selected VC.

The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 second, 1 minute, 10 minutes, or 1 hour, 1 day, 1 week. The Auto button lets you see continuously-updating live metering info.

The following charts are displayed:

Chart	Description
Throughput (OP/s)	The number of operations (PUT/GET/DELETE) issued to the accounts database and handled by the selected VC per second
Bandwidth (MB/s)	Total throughput (in MB) of read and write commands issued by the selected VC to the accounts DB per second
Latency (ms)	Average response time of all operations (PUT/GET/DELETE) issued to the accounts database and handled by the selected VC per selected interval



Container Service Metering

The Metering Charts provide live metering of the IO workload on the containers database at the backend of the selected VC.

The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 second, 1 minute, 10 minutes, or 1 hour, 1 day, 1 week. The Auto button lets you see continuously-updating live metering info.

The following charts are displayed:

Chart	Description
Throughput (OP/s)	The number of operations (PUT/GET/DELETE) issued to containers and handled by the selected VC per second
Bandwidth (MB/s)	Total throughput (in MB) of operations (PUT/GET/DELETE) issued by the selected VC to containers per second
Latency (ms)	Average response time of all operations (PUT/GET/DELETE) issued to containers and handled by the selected VC per selected interval

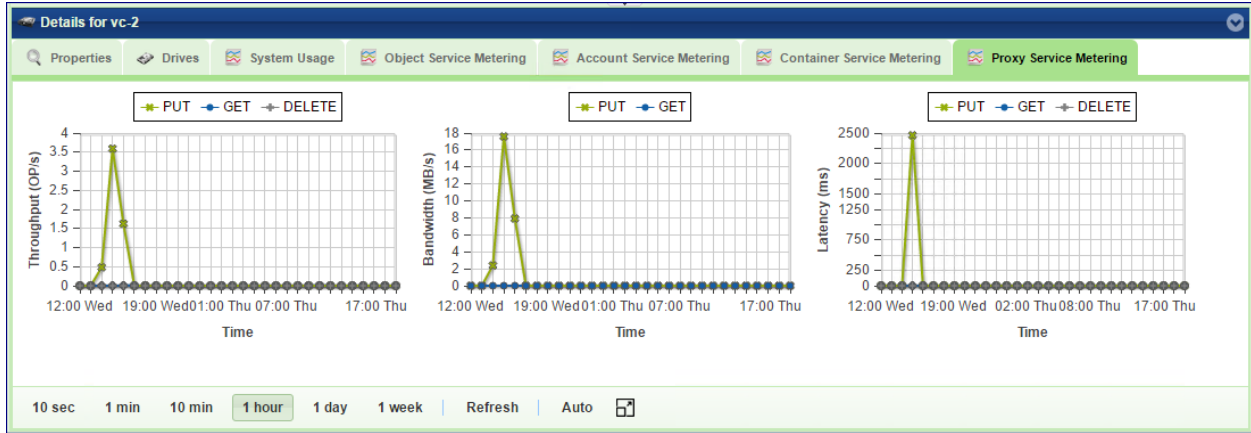
Frontend Metering

The Metering Charts provide live metering of the IO workload at the frontend of the selected VC.

The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 second, 1 minute, 10 minutes, or 1 hour, 1 day, 1 week. The Auto button lets you see continuously-updating live metering info.

The following charts are displayed:

Chart	Description
Throughput (OP/s)	The number of operations (PUT/GET/DELETE) issued to objects and handled by the proxy of the selected VC per second
Bandwidth (MB/s)	Total throughput (in MB) of read and write commands issued to proxy of the selected VC per second
Latency (ms)	Average response time of all operations (PUT/GET/DELETE) issued to objects and handled by proxy of the selected VC per selected interval



5.3 Load Balancer Groups (Optional)

Zadara Elastic Load Balancer can be enabled for the VPSA Object Storage in order to provide improved performance and load allocation across the VPSA Object Storage VCs. Once enabled, a dedicated VC will be added to the VPSA Object Storage as the Load Balancer Master. The Load Balancer Master VC will aggregate a bulk of up to 12 VCs from the same protection zone under the same VRID index.

From this view, a VPSA Object Storage administrator can review the utilization and distribution of each Load Balancer Group.

Property	Description
ID	An internally assigned unique ID
VRID	The VRRP VRID assigned to the Elastic Load Balancer Group
VC Master	The Load Balancer Group Active (Master) VC
IPv4/IPv6	The Load Balancer Group Active (Master) VC IP address
Protection Zone	The Zadara cloud protection zone
Added	Date & time when the LBG was created
Modified	Date & time when the LBG was last modified

5.4 Managing Storage Policies

Storage Policies provide a way for object storage providers to differentiate service levels, features and behaviors of a Object Storage deployment.

Policies can be thought of as a group of drives, with a redundancy level policy assigned to it.

Before placing object data into the VPSA Object Storage, users create a container which holds the listing of all objects stored under the container's namespace. Users can select the Storage Policy that will be used when storing data objects under a container's namespace when they create the container. All objects stored in a container will be placed according the configuration of the Storage Policy which was set when the container was created. If no policy was specified at the container creation time, the default policy is used.

To ensure availability of the VPSA object Storage data, the drives assigned to a Storage Policy are evenly distributed between Object Storage Fault Domains. The cloud administrator defines the Fault Domain of each Storage Node. The system makes sure to allocated drives across zones based on the Storage Policy type

Storage Policies allow some level of segmenting in terms of quality of service, within a single system for various purposes. Storage Policies allow objects to be stored based on the following criteria:

- **Quality of Service:** By using different disk drives for different policies, tiers of storage performance can be created. For example, an SSD-only policy can be created used to implement a low-latency/high performance tier.
- **Number of Replicas:** offer different protection levels in the same VPSA Object Storage cluster
 - 2 Way replication offers protection for one FD failure, at the cost of 50% storage utilization.
 - Erasure Coding (2+1, 6+3) offers protection for 1 FD failures, at the cost of 67% storage utilization.
 - Erasure Coding (6+2, 9+3) offers protection for 1 FD failures, at the cost of 75% storage utilization.
 - 2 Way replication (Multizone-HA offers protection for one FD failure, on each zone or a complete protection zone failure at the cost of 50% storage utilization per protection zone.
 - Erasure Coding (4+2, 2+1 - Multizone-HA) offers protection for 1 FD failures, on each zone or a complete protection zone failure at the cost of 67% storage utilization per protection zone.
 - Erasure Coding (6+2, 9+3 - Multizone-HA) offers protection for 1 FD failures, on each zone or a complete protection zone failure at the cost of 75% storage utilization per protection zone.

The following Storage Policies are supported:

Table 1: Object Storage Data Protection Policies

Policy Type	Redun- dancy	Minimal Configuration
2 Way	x 2	2 VCs on 2 SNs, each in a different Fault Domain
Erasure Coding 2+1	x 1.5	3 VCs on 3 SNs, each in a different Fault Domain
Erasure Coding 4+2	x 1.5	3 VCs on 3 SNs, each in a different Fault Domain
Erasure Coding 6+2	x 1.33	4 VCs on 4 SNs, each in a different Fault Domain
Erasure Coding 9+3	x 1.33	4 VCs on 4 SNs, each in a different Fault Domain
Erasure Coding 2+1 4+2 (Multizone-HA)	x 1.5	3 VCs on 3 SNs, each in a different Fault Domain (in each region)
Erasure Coding 6+2 9+3 (Multizone-HA)	x 1.33	4 VCs on 4 SNs, each in a different Fault Domain (in each region)

Each drive in the system is assigned to one Storage Policy.

VPSA Object Storage is created with a default data Storage Policy for objects and another system Storage Policy for metadata. The VPSA Object Storage administrator (zios_admin) can later on create additional storage policies, expand existing policies and set a specific policy as the Default Policy.

For Multizone HA VPSA Object Storage, the protection policy is created symmetrically on both zones, in each availability zone, the same protection policy will be created in order to sustain a complete availability zone failure.

Policies are assigned when a container is created. Once a container has been assigned for a policy, it cannot be changed (unless it is deleted/recreated).

5.4.1 Storage Policies (VPSA Object Storage Admin)

When a VPSA Object Storage system is created, 2 policies are created by default:

- MetadataPolicy: Used to store the Accounts and Containers metadata, usually contains 2 SSD drives, with 2-way replication
- 2-way/EC-protection-policy: Used to store the users' objects, usually contain all the drives that were assigned to the Object Storage at creation time, with 2-way replication or EC protection, according to the initial selection on the provisioning portal.

5.4.2 Policies Properties (VPSA Object Storage Admin)

You can view the following properties and metering information in the Policies Details South Panel tabs:

Properties

Each Policy includes the following properties:

Property	Description
ID	An internally assigned unique ID
Name	The name of Policy
Type	Object or Account/Container
State	Not Configured / Configuring / Initialized
Description	A user defined policy description
GB per Month Price	Price of used capacity for charge back purposes
Health Status	Normal / Degraded / Critical
Health Percentage	Indicates the percentage of the stored data that is accessible.
Rebalance Status	Normal / Rebalancing / Failed
Rebalance Prec.	Indicates the progress of the rebalance process
Cross-Region Rep-mode	Synchronous (for VPSA Multizone HA)
Policy Capacity	Total usable capacity of the storage policy
Policy Used Capacity	Total capacity used in the storage policy
Data Usage	Amount of written data in the storage policy by the Object Storage account's users
Containers	Total amount of containers created within the policy
Objects	Total amount of objects created within the policy
Default	Yes/No
Redundancy Level	2-way/EC
Ring Version	Ring Database version
Rebalanced	The date and time when the Policy was last rebalanced. (Rebalance usually happens when the HW configuration changes, Adding/removing drives, failed components, etc.)
Added	The date and time when the Policy was added
Modified	The date and time when the Policy was last modified

✓ **Note:** Please note that **Policy Used Capacity** attribute will always reflect higher capacity consumption than **Data Usage**. The **Policy Used Capacity** also include the underlying filesystem metadata and reserved storage while the policy is being rebalanced. **Data Usage** is the actual account's data usage representation.

Drives

List the drives assigned with the selected Storage Policy.

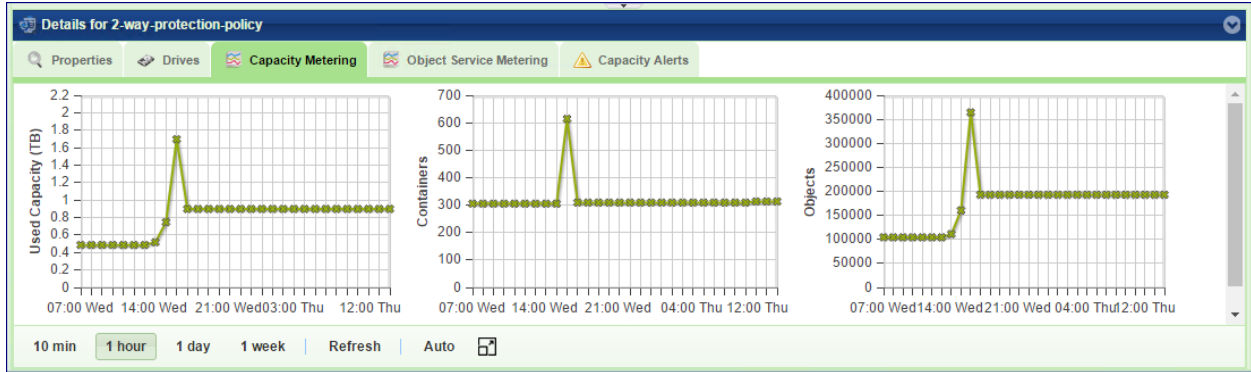
Capacity Metering

The Metering Charts provide live metering of the capacity usage associated with the selected Policy.

The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 minutes, or 1 hour, 1 day, 1 week. The Auto button lets you see continuously-updating live metering info.

The following charts are displayed:

Chart	Description
Used Capacity	Total storage capacity consumed in the selected Policy
Containers	Total numbers of containers that store their objects in the selected policy
Objects	Total numbers of objects stored in the selected policy



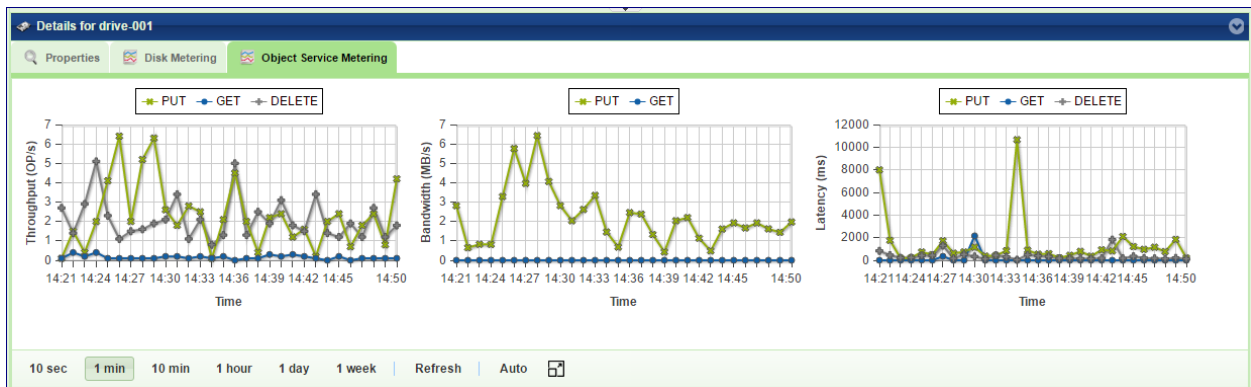
Backend Metering

The Metering Charts provide live metering of the IO workload associated with the selected Policy.

The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 second, 1 minute, 10 minutes, or 1 hour, 1 day, 1 week. The Auto button lets you see continuously-updating live metering info.

The following charts are displayed:

Chart	Description
Throughput (OP/s)	The number of operations (PUT/GET/DELETE) issued to the Drives of the selected Policy per second
Bandwidth (MB/s)	Total throughput (in MB) of read and write commands issued to the Drives of selected Policy per second
Av. Drive La-tency	Average response time of all operations (PUT/GET/DELETE) issued to objects in the selected Policy per selected interval



Frontend Metering

The Metering Charts provide live metering of the IO workload associated with the traffic coming to the selected Policy.

The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 second, 1 minute, 10 minutes, or 1 hour, 1 day, 1 week. The Auto button lets you see continuously-updating live metering info.

The following charts are displayed:

Chart	Description
Throughput (OP/s)	The number of operations (PUT/GET/DELETE) issued to objects in the selected Policy per second
Bandwidth (MB\s)	Total throughput (in MB) of read and write commands issued to the selected Policy per second
Avg. Latency (ms)	Average response time of all operations (PUT/GET/DELETE) issued to objects in the selected Policy per selected interval

Capacity Alerts

The VPSA Object Storage administrator can set their own custom configuration for capacity monitoring.

Alert Threshold

Send Alert when it is estimated that the Policy will be at full capacity within the given time period (default 43,200 minutes - 30 days).

Alert Interval

The period of the sample collection window to calculate the rate at which the free space is consumed in the storage policy.

- Default 1,440 minutes
- Minimal value is 10 minutes
- Minimum used capacity to trigger the alert is 60%

Emergency Threshold

The threshold to trigger administrator capacity emergency state notifications

- Default is 85%
- Minimal value is 60%
- Alert will be triggered hourly as long as the policy is in "Emergency state"

5.4.3 Adding Drives to Policy (VPSA Object Storage Admin)

Drives are added to an Object Storage policy via the Provisioning Portal. To add drives into a policy, go to the Provisioning Portal, select the VPSA Object Storage of interest and click Add Storage. Follow the instruction here: [Adding Drives to an Existing Storage Policy \(VPSA Object Storage Admin\)](#).

✓ **Note:** Drive-related operations in a storage policy will require rebalance that might take several hours until completion.

5.4.4 Removing Drives from Policy (VPSA Object Storage Admin)

If there is a need to reduce the total available capacity of a given policy, or to remove some failed drives that were detached from the policy, you may remove drives from the policy and return them to the cloud for a different use. To remove drives from a Policy go to GUI > Policies, select the policy of interest, and click Remove Drives.

Name	Quantity	Current
SATA_4656GB_7200RPM	0	5
SAS_278GB_15000RPM	6	26
SATA_5588GB_7200RPM	0	8

The dialog that will open will list all the drives types and quantities that currently belong to the policy. Set the number of drives you want to remove from each type, and click Remove.

✓ **Note:** Drive-related operations in a storage policy will require rebalance that might take several hours until completion.

ACCOUNTS AND USERS MANAGEMENT

6.1 Managing Accounts

Object Storage Accounts are a collection of containers and are typically associated with a tenant. VPSA Object Storage Account Management allows you to view/configure account properties, permissions, and storage usage, and see lists of users associated with the account.

6.1.1 Creating account (zios_admin)

When the system is first built, a default account is created called zios_admin account. At that point only the VPSA Object Storage Admin has access to this account. In order to provision object storage to customers, the VPSA Object Storage Admin needs to create accounts.

To create additional accounts, first select the accounts entity in the Main Navigation Panel (left panel) under **Account Management**, and then click the **Create** button in the top toolbar above the account pane.

In the dialog that opens, give a name to the new account and click **Add**. The new account will be added.

6.1.2 Viewing Accounts Properties (VPSA Object Storage Admin and Account Admin)

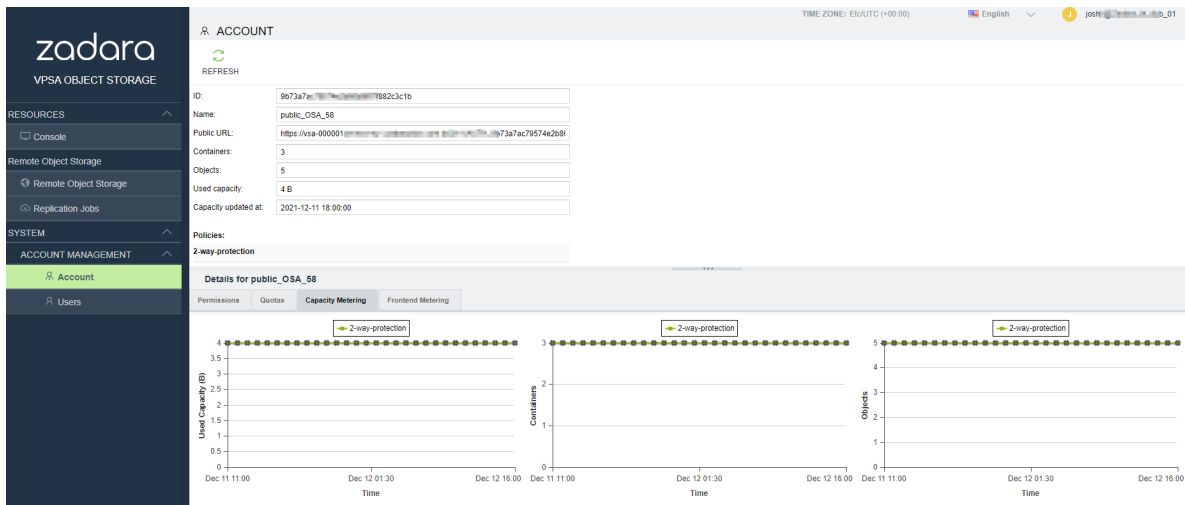
The following properties and information can be viewed:

- **Properties** - the following account properties are displayed in the account pane in the **Account Management > Account** view.

✓ **Note:** Parameters marked with (*) in table below are only available to VPSA Object Storage Administrators.

Property	Description
ID	An internally assigned unique ID
Name	The name of the Account
Status (*)	Normal / Deleting / Deleted, awaiting cleanup
Enabled (*)	Yes/No
Public URL	The URL that identifies this account. To be used by the REST API
Containers	Number of containers in the selected Account
Objects	Number of objects stored in the selected Account
Used Capacity	Amount of written data in the Account
Capacity Updated at	Date when capacity was measured
Policies	Show statistics per each policy (e.g. 2-way protection) used by this account. Details include: <ul style="list-style-type: none"> - Containers: Number of containers this account keeps in this policy - Objects: Number of objects this account keeps in this policy - Used Capacity: Capacity consumed by this account keeps in this policy

- **Users** - lists of users per account are displayed in the users pane in the **Account Management > Users** view.
- **Permissions** - account permissions are displayed in the details pane, permission tab in the **Account Management > Account** view. For more information on account permissions, see [Setting Account Permissions \(Account Admin\)](#).
- **Quotas** - quotas can be set on the storage capacity available to an account. For more information, see [Account Quota Management \(VPSA Object Storage Admin or Account Admin\)](#).
- **Capacity Metering** - provide live metering of the capacity usage associated with the selected account as shown below.

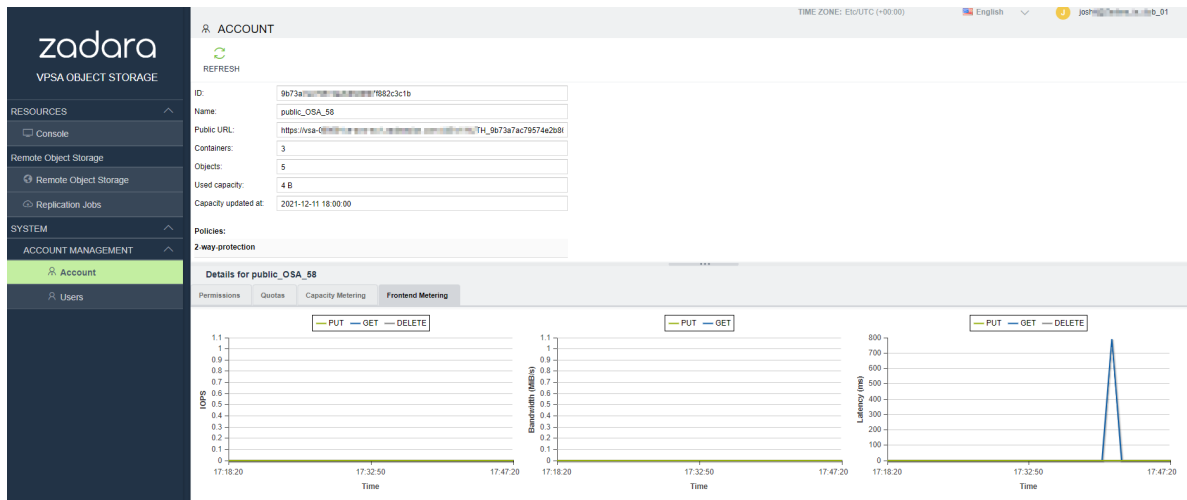


The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 minutes, or 1 hour, 1 day, 1 week. The **Refresh** button forces a refresh of the data displayed in the graphs. The **Auto** button lets you see continuously-updating live metering info.

The following charts are displayed:

Chart	Description
Used Capacity	Total storage capacity consumed in the selected account
Containers	Total numbers of containers belonging to the selected account, by storage policy
Objects	Total numbers of objects belonging to the selected account, by storage policy

- **Frontend Metering** - provide live metering of the IO workload at the Object Storage frontend associated with the selected account as shown below.



The charts display the metering data as it was captured in the past 20 intervals. An interval length can be one of the following: 10 second, 1 minute, 10 minutes, or 1 hour, 1 day, 1 week. The **Refresh** button forces a refresh of the data displayed in the graphs. The **Auto** button lets you see continuously-updating live metering info.

The following charts are displayed:

Chart	Description
Throughput (OP/s)	The number of operations (PUT/GET/DELETE) issued to objects that belong to the selected account.
Bandwidth (MB/s)	Total throughput (in MB) of read and write commands issued to proxy for the selected account.
Latency (ms)	Average response time of all operations (PUT/GET/DELETE) issued to objects of the selected Account per selected interval.

6.1.3 Account Quota Management (VPSA Object Storage Admin or Account Admin)

If needed, a VPSA Object Storage Admin or Account Admin can set an account level/container level quota.

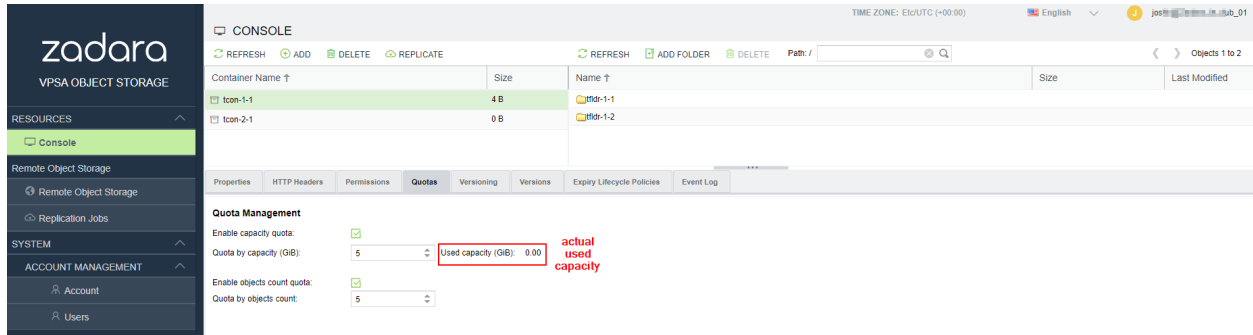
✓ **Note:** Once enabled, it will take up to 10 minutes for the quota management to be activated.

Account Level Quota Management (VPSA Object Storage admin only)

1. Navigate to **Account Management > Account**.
2. Select the desired account and open the **Quotas** tab in the bottom **Details** tab.
3. To enable account level quotas, enter the desired account level quota capacity limitations and click **Update**.
4. Note that once enabled, the actual capacity usage will also be available in the same tab.

Container Level Quota Management

1. In the console view, select the desired container in the top pane, and open the **Quotas** tab in the bottom **Details** tab.
2. To enable container level quotas, enter the desired container level quota capacity limitations and click **Update**.
3. Note that once enabled, the actual capacity usage will also be available in the same tab.



6.1.4 Deleting account (VPSA Object Storage Admin)

To delete an account, navigate to **Account Management > Account**, select the account to be deleted, and click **Delete** in the top toolbar.

✓ **Note:** Deleting an account is an irreversible operation, and requires double confirmation

✓ **Note:** Once an account is deleted, all account user data is removed. However account billing information still exists in the system for usage report generation. Click **Cleanup** in top toolbar to completely remove it from the system.

6.1.5 Disabling an account (VPSA Object Storage Admin)

To disable an account, navigate to **Account Management > Account**, select the account to be deleted, and click **Disable** in the top toolbar.

✓ **Note:** Disable/Enable button toggles as the account state changes.


✓ **Note:** Once an account is disabled, the account is no longer available for read or write operations. However, VPSA Object Storage maintains the account definitions (users, access rights, etc.), as well as all the containers and objects.

6.1.6 Self Service Account Creation (Account Admin)

In addition to creation of a new account by the VPSA Object Storage Admin as described in [Creating account \(zios_admin\)](#), a user can be given permission to create his own account. In this case, a user will request creation of a new account via a provided URL. The VPSA Object Storage Admin will receive and must then approve the request. The account will then be created and the user who initiated the request will become the Account Admin.

The detailed procedure for account self-creation is as follows:

1. Use the GUI URL received from VPSA Object Storage Admin to access the following login screen.



ZIOS Zadara_ie_dub_01 - Login

zadara

Account: *

[Create new account](#)

Username: *

Password: *

[Forgot password?](#)

Login

2. Click **Create new account** and enter the following information:

- Name for the new Account
- Your username as the Account admin
- Your email address
- Select a password

✓ **Note:** While account name and the username for a given user are unique across the VPSA Object Storage, the same email address can be used for multiple users. This is useful in cases the same entity needs visibility to more than a single account.

3. Click **Create Account**. This will create an Account creation request that will go to the VPSA Object Storage Admin for approval. Once approved, You will automatically become the Account Admin of your new account.
4. The user initiating the request will receive and automated email response confirming the request.

5. The VPSA Object Storage Admin will receive an email informing him about the pending request:
6. The VPSA Object Storage Admin should open the GUI, select **Users** in the Main Navigation Panel (Left Panel) under **Account Management**, select the pending Account request, and either **Approve** or **Deny** it.
7. Upon approval, the new account will be created, the account admin will be defined with the given credentials, and receive email notification with the following information:
 - VPSA Object Storage Account Management & Console URL
 - VPSA Object Storage API Endpoint URL
 - Account Name
 - User Name

6.2 Managing Users

6.2.1 Understanding User Roles

The VPSA Object Storage support the following roles:

- **VPSA Object Storage Admin** - responsible for the administration of the VPSA Object Storage. This is the user that created the VPSA Object Storage in the Zadara Provisioning Portal.
- **VPSA Object Storage Admin - Read Only** - dedicated read-only role for cross-accounts monitoring and reporting purposes. **The Read-Only role is available for the zios_admin account only.** A Read-Only user will have access to the VPSA Object Storage RestAPI, however he will not have data access. The user role is designated for monitoring and reporting purposes, such as:
 - Performance monitoring
 - Capacity monitoring
 - Usage reports & billing automation
- **Account Administrators** - responsible for the administration of his account.
- **Account Member** - can perform object storage operations according to the given permissions within the limits of that account.

6.2.2 User Information

Information about currently logged-in users is displayed by clicking the user name in upper right corner of GUI.

The screenshot displays the 'USER INFORMATION' page in the ZADARA VPSA Object Storage console. The page is organized into several sections:

- Account Information:** Includes fields for Username, Email, Account, User ID, Account ID, and Dual Factor Authentication (Deactivated).
- Authentication:** Includes fields for S3 Access Key, S3 Secret Key, Region (eu-west-1), and API Token.
- Connectivity - Front End Network:** Includes fields for API Endpoint, V3 Auth Endpoint, and Account URL.
- Connectivity - Public Network:** Includes fields for Public IP, Public API Endpoint, Public V3 Auth Endpoint, and Public Account URL.

The following User's properties are displayed:

Property	Description
Account Information	
Username	The login ID of the User
Email	User's email address
Account	The account where the user belongs
User ID	An internally assigned unique ID
Account ID	An internally assigned unique ID
Dual Factor Auth.	Indication if this user has dual factor authentication activated
Authentication	
S3 Access Key	To be used by client using the S3 interface
S3 Secret Key	To be used by client using the S3 interface
Region	Region name
API Token	Token to be used for authentication by the REST API The token expires in 24 hours. Good practice is for every script to start with a new token. See API guide: http://zios-api.zadarastorage.com
Connectivity - Front End Network	
API Endpoint	The effective Front End private address for REST API for all IO requests
V3 Auth Endpoint	The effective Front End private address for REST API auth requests
Account URL	The Front End private network URL that identifies this user's account. To be used by the REST API.
Connectivity - Public Network	
Public IP	Public IP of the VPSA Object Storage (see: Assigning Public IPs (VPSA Object Storage Admin))
Public API endpoint	The public address for REST API for all IO requests
Public V3 Auth End-point	The public address for REST API auth requests
Public Account URL	The public network URL that identifies this user's account. To be used by the REST API

✓ **Note:** The connected user can reset his Object Storage Access/Secret keys. The existing access and secret keys will be revoked.

6.2.3 Creating User (VPSA Object Storage Admin, Account Admin)

To create a new user in a VPSA Object Storage account:

1. Within the VPSA Object Storage console, navigate to **Account Management > Users**.
2. From top toolbar over Users pane, click **Create**.
3. In the **Add User** dialogue which opens, enter the following:
 - **Username**
 - **Email**
 - **Role**

✓ **Note:** Everything an Account admin does, is within the context of that Account. So, when an Account admin creates users, there is no need to select an Account.

✓ **Note:** Users with VPSA Object Storage Admin role can only be created in the zios_admin account.

4. Click **Add User**. The new user will receive email with the following information:
 - VPSA Object Storage Account Management & Console URL
 - VPSA Object Storage API Endpoint URL
 - Account Name
 - User Name
 - Assigned User Role
 - Temporary Password

✓ **Note:** The new user should use the temporary password for the first login, and then change the password after logging on.

6.2.4 Viewing Users Properties (VPSA Object Storage Admin, Account Admin)

To view user properties in a VPSA Object Storage account:

1. Within the VPSA Object Storage console, navigate to **Account Management > Users**. User properties are displayed in the top pane of the console.
2. To view additional properties in the lower details pane, select a single user from the displayed list in the top pane.

The screenshot shows the 'USERS' management interface. At the top, there are action buttons: REFRESH, CREATE, DELETE, DISABLE, RESET PASSWORD, RESET S3 CREDENTIALS, CHANGE ROLE, and UNLOCK. Below these is a table with the following data:

Name	Email	ID	Enabled	Dual Factor Authentication	Role	Account	Locked
josil	josil@zadara.com	456544...	Yes	No	Member	public_OSA_58	No
josil	josil@zadara.com	fa3534...	Yes	No	Account Admin	public_OSA_58	No

Below the table, the 'Details' section for the selected user shows the following properties:

Name:	josil
Email:	josil@zadara.com
ID:	fa3534...
Account Name:	public_OSA_58
Account ID:	96734...
Role:	Account Admin
Locked:	No
Notify on Events:	No
Dual Factor Authentication:	No
Enabled:	Yes

The following user properties are displayed:

Property	Description
Name	The login ID of the User
Email	User's email address
ID	An internally assigned unique ID
Enabled	User is active or not. Disabled user can't login and can't perform any operation
Dual Factor Auth.	Indication if this user has dual factor authentication activated
Role	VPSA Object Storage Admin, Account Admin, Member
Account Name	The account where the user belongs
Account ID	An internally assigned unique ID
Notify on Events	Specify is this user want to get email notifications for events

6.2.5 Deleting users (VPSA Object Storage Admin, Account Admin)

To delete a user in a VPSA Object Storage account:

1. Within the VPSA Object Storage console, navigate to **Account Management > Users**.
2. From the displayed list, select the user to be deleted and click **Delete** from the top toolbar.
3. In the **Confirm Deletion** dialogue which opens, click **Yes**. Note the deletion process may take a few minutes.

6.2.6 Disabling/Enabling users (VPSA Object Storage Admin, Account Admin)

A disabled user cannot login to the GUI or perform any operation via the REST API. However the system remembers the user with all the properties and permissions. Once users are enabled, they can resume operations as before.

To disable a user in a VPSA Object Storage account:

1. Within the VPSA Object Storage console, navigate to **Account Management > Users**.
2. From the displayed list, select the user to be disabled and click **Disable** from the top toolbar.
3. In the **Confirm Action** dialogue which opens, click **Yes**. Note the process may take a few minutes.

✓ **Note:** To enable a user who has been disabled, repeat the process above and select **Enable** from the toolbar instead of **Disable**.

6.2.7 Reset password (VPSA Object Storage Admin, Account Admin)

VPSA Object Storage Admins and Account Admins can reset Users' passwords. When resetting a password, the User will receive an email with a temporary password that they will have to change at the next login.

To reset a user password in a VPSA Object Storage account:

1. Within the VPSA Object Storage console, navigate to **Account Management > Users**.
2. From the displayed list, select the user whose password is to be reset and click **Reset Password** from the top toolbar.
3. In the **Confirm Password Reset** dialogue which opens, click **Yes**.
4. The user will receive an email with a temporary password.

✓ **Note:** Users who have forgotten their password do not need to refer to the admin to reset their password. They can click the **Forgot Password** link on the login screen.

6.2.8 Change Role (VPSA Object Storage Admin, Account Admin)

An Account Member can be changed to an Account Admin, and vice versa. Users under the system zios_admin account can be promoted to VPSA Object Storage Admin only by someone who currently has the VPSA Object Storage Admin role.

To change a user role in a VPSA Object Storage account:

1. Within the VPSA Object Storage console, navigate to **Account Management > Users**.
2. From the displayed list, select the user whose role is to be disabled and click **Change Role** from the top toolbar.
3. In the **Change Role** dialogue which opens, enter the new user role and click **Change Roles**.

6.3 Dual Factor Authentication

It is a common practice to protect access in case of compromised password. For this purpose, the VPSA Object Storage supports Dual Factor Authentication (DFA) using the Authenticator mobile application. Each user can turn Dual Factor Authentication on/off for themselves. The VPSA Object Storage Admin can force Dual Factor Authentication on all users.

✓ **Note:** To use the DFA, install Authenticator mobile app (e.g. Google Authenticator) from Google Play or Apple AppStore on your mobile device.

6.3.1 Enabling Dual Factor Authentication

1. In the VPSA Object Storage console, click on user name on top, right corner of screen. Current user property details will be displayed.

The screenshot displays the 'USER INFORMATION' page in the Zadara VPSA Object Storage interface. The page is divided into several sections:

- Account information:** Includes fields for Username (josh), Email (josh@zadara.com), Account (public_OSA_58), User ID (fa35...7919fe), Account ID (9b73a...82c3c1b), and Dual Factor Authentication (Deactivated). A red box highlights the 'Activate' button next to the Dual Factor Authentication status.
- Authentication:** Includes fields for S3 Access Key (1b9e9a2d...93355899), S3 Secret Key (masked), Region (eu-west-1), and API Token (masked).
- Connectivity - Front End Network:** Includes fields for API Endpoint (https://vsa-0...com:443), V3 Auth Endpoint (https://vsa-0...com:5000v3), and Account URL (https://vsa-0...com:443).
- Connectivity - Public Network:** Includes fields for Public IP (154...3), Public API Endpoint (vsa-0000...zadara.com), Public V3 Auth Endpoint (https://vsa-0...com:5000v3), and Public Account URL (https://vsa-0...com:443).

2. For **Dual Factor Authentication**, click **Activate** or **Deactivate**. Close the properties dialog, and logout.
3. The next time you login, a confirmation screen will open with a QR code. Scan the code with your mobile device, and enter the token.
4. From now on, during every login, you will be asked to enter the DFA token from the Authenticator app on your mobile device.

Important: The mobile device that runs the Authenticator app is needed for login. In case the device was lost or replaced, the user must ask the VPSA admin to reset their DFA settings. VPSA admin must contact Zadara support to reset the DFA.

6.3.2 Enforcing Dual Factor Authentication

VPSA administrator can force DFA for all users. In **setting/Security** click **Edit** on the Dual Factor Authentication, select the checkbox and **Save**. This setting change does not have immediate effect. Next time each user will login, the DFA token from the mobile device Authenticator app be required.

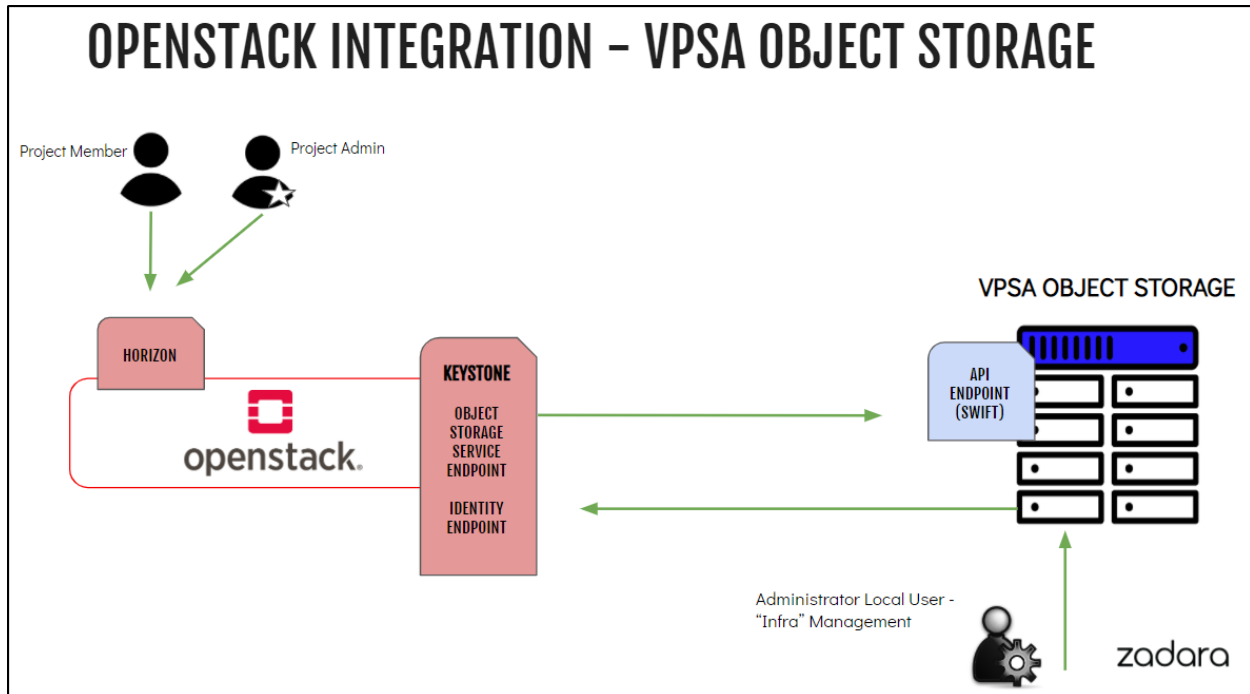
✓ **Note:** When DFA enforcement is removed, the users with DFA configured are still required to use the temporary code when logging in. However each user can change his settings in the user properties as described above.

6.4 Remote Authentication

An external identity provider (Openstack Keystone) can be used as the authentication engine for the Object Storage. This integration will expose Zadara's Object Storage service directly to the Openstack dashboard (Horizon); the Object Storage will be available immediately to all Openstack registered users.

The following section will provide an overview of this capability along with the required steps to properly integrate Keystone (the OpenStack identity service) with Zadara VPSA Object Storage.

Openstack version: Train and later



6.4.1 Openstack Prerequisites

Creating Openstack Object-Store Service

```
$ openstack service create --name=vpsa-obs --description "Zadara Object Storage" object-store
```

The expected output is a confirmation the service was created, similar to the following:

```
+-----+
| Field      | Value                                     |
+-----+-----+
| description | Zadara Object Storage                   |
+-----+-----+
| enabled     | True                                     |
+-----+-----+
| id          | 74b0f72dcf3f4c7eb50462122c1d40cc      |
+-----+-----+
| name       | vpsa-obs                                 |
+-----+-----+
| type       | object-store                             |
+-----+-----+
```


Creating Object-Store Endpoints

The Object Store service endpoints should direct Openstack users to use the VPSA Object Storage, the URL in the following examples (<https://vsa-0000004e-zadara-iop-01.zadara.com>) should be replaced with the actual target VPSA Object Storage.

The service exposes three endpoints: internal, public & admin endpoints. All three should be configured in order to allow seamless integration.

Internal Endpoint

```
$ openstack endpoint create --region RegionOne vpsa-obs internal "https://vsa-0000004e-zadara-iop-01.zadara.com/v1/KEY_\$(tenant_id)s"
```

Public Endpoint

```
$ openstack endpoint create --region RegionOne vpsa-obs public "https://vsa-0000004e-zadara-iop-01.zadara.com/v1/KEY_\$(tenant_id)s"
```

Admin Endpoint

```
$ openstack endpoint create --region RegionOne vpsa-obs admin "https://vsa-0000004e-zadara-iop-01.zadara.com/v1/"
```

Confirm all 3 endpoints were created as expected.

✓ **Note:** Openstack is not actively testing for endpoint connectivity, it is recommended to ensure the endpoint is accessible prior its configuration.

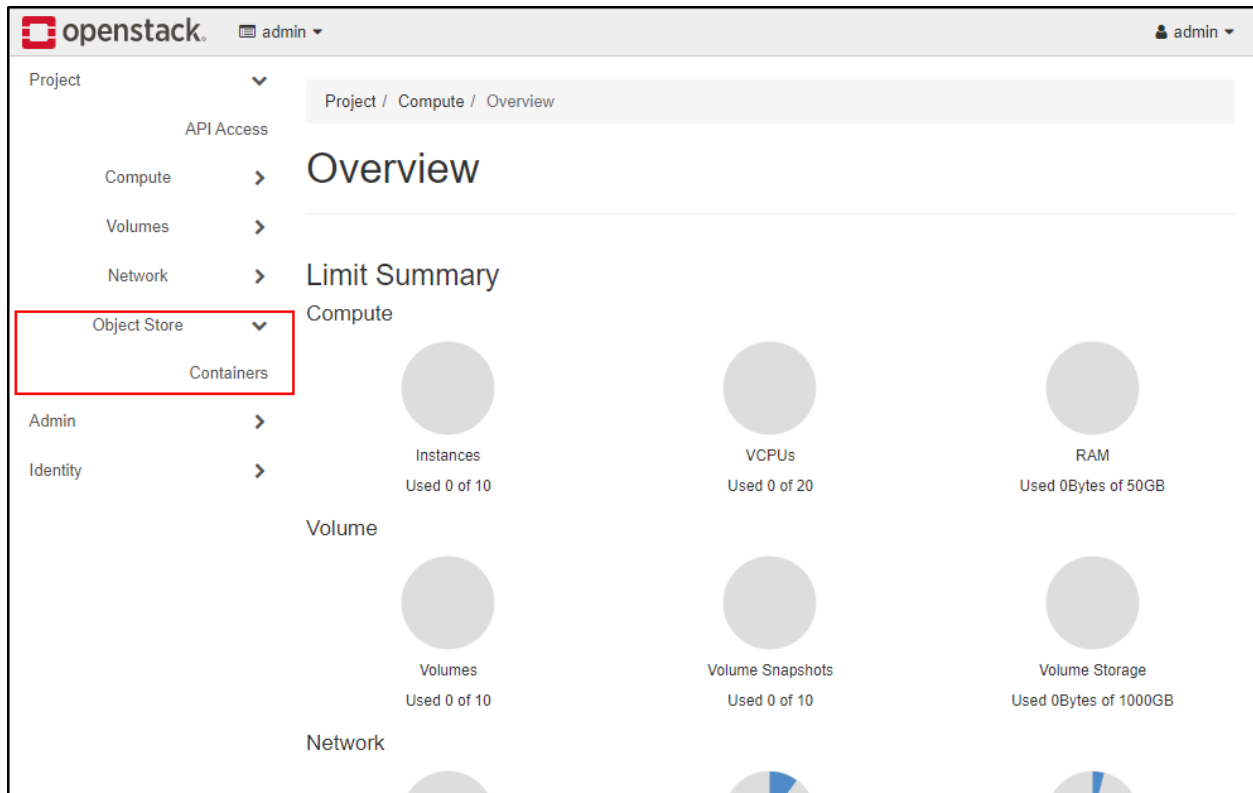
```
$ openstack endpoint list --service vpsa-obs -c 'Service Name' -c 'Service Type' -c URL
```

The expected result is the list of all three endpoints as configured in the previous steps, similar to the following:

```
+-----+-----+-----+
| Service Name | Service Type | URL |
+-----+-----+-----+
| vpsa-obs     | object-store | https://vsa-0000004e-zadara-iop-01.zadara.com/v1/KEY_$(tenant_id)s |
+-----+-----+-----+
| vpsa-obs     | object-store | https://vsa-0000004e-zadara-iop-01.zadara.com/v1/ |
+-----+-----+-----+
| vpsa-obs     | object-store | https://vsa-0000004e-zadara-iop-01.zadara.com/v1/KEY_$(tenant_id)s |
+-----+-----+-----+
```

Horizon Dashboard

At this point, horizon should have an additional section "Object Storage".



6.4.2 VPSA Object Storage Configuration

The VPSA Object Storage will require the Openstack endpoint URL. Ensure you have a valid endpoint prior proceeding to the next step.

Private domain names are supported, however, will require the VPSA Object Storage administrator to set a custom name server under **Settings > Network**.

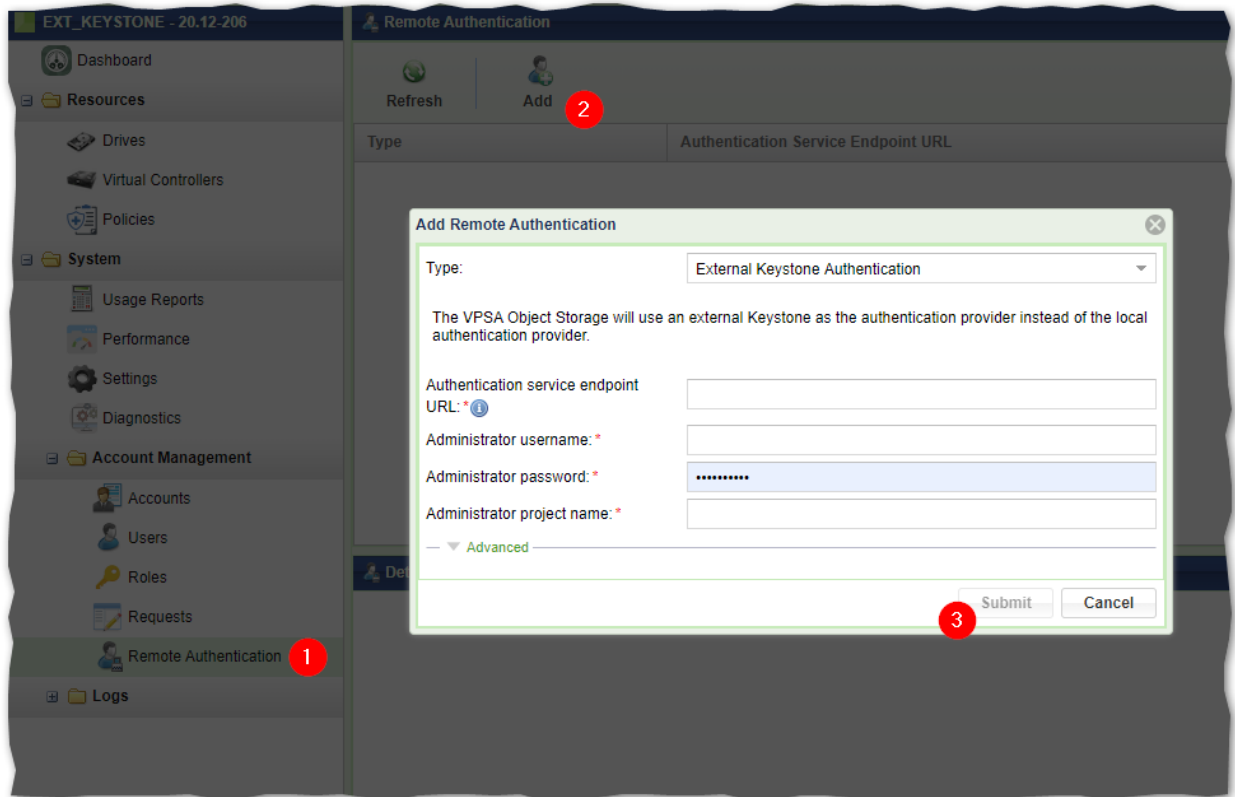
The endpoint can be retrieved from Horizon or by using the openstack cli tool, as in the following example:

```
$ openstack endpoint list --service identity
+-----+-----+-----+
| Service Name | Service Type | URL |
+-----+-----+-----+
| keystone     | identity     | http://192.168.13.37/identity |
+-----+-----+-----+
| keystone     | identity     | http://192.168.13.37/identity |
+-----+-----+-----+
```

Important: It is expected that the Keystone Authentication endpoint will be accessible from the VPSA Object Storage Front End network, public/secondary VNI network endpoint or are not supported.

Enabling Remote Authentication

In the VPSA Object Storage management interface, navigate to the **Account Management > Remote Authentication** view.



The following information is required:

- **Authentication service endpoint URL** - the Openstack Keystone identity URL as retrieved from Openstack.
- **Administrator username** - the openstack administrator username.
- **Administrator password** - the openstack administrator password.
- **Administrator project name** - the openstack administrator project.

Upon submitting the form, the VPSA Object Storage user interface will reload in order to apply the changes.

Important: As of this point all user management will be subject to the Openstack Keystone service and will not be managed from the VPSA Object Storage GUI. Only the ZIOS_ADMIN account and the cloud_admin user (via Zadara Command Center) will have access to the VPSA Object Storage user interface. All existing local accounts will not be accessible.

Navigating to the **Accounts** view in the **VPSA Object Storage user interface** section will now list all Openstack Projects. This view is the administrative visibility to the account consumption and utilization.

In the accounts listing, the administrator will be able to review:

1. Account name as defined in keystone.
2. Status - the status of the account in the **VPSA Object Storage**. An account will be considered active if one of its users have used the Object Storage service from Openstack. This is useful when managing a large cluster with a

large number of users/projects.

3. The account id (project ID) as defined in Openstack.
4. The container count for the selected account.
5. The overall object count (across all containers)
6. Used capacity for the selected account.

✓ **Note:** The consumption usage may take a couple of minutes to reflect the actual usage.

6.4.3 Verify The Keystone User Access To The Object Storage Service

Openstack CLI

1. Source a valid user information.
2. Try to create a container using the openstack cli

```
$ openstack container create shlomi
```

3. Try to list the container recently created

```
$ openstack container list
+-----+
| Name   |
+-----+
| shlomi |
+-----+
```

S3 Credentials

Openstack will allow its users to interact with the cluster resources using aws s3 credentials.

These credentials can be used in order to configure S3 clients for Object Storage operations.

1. Create ec2 credentials

```
$ openstack ec2 credentials create
```

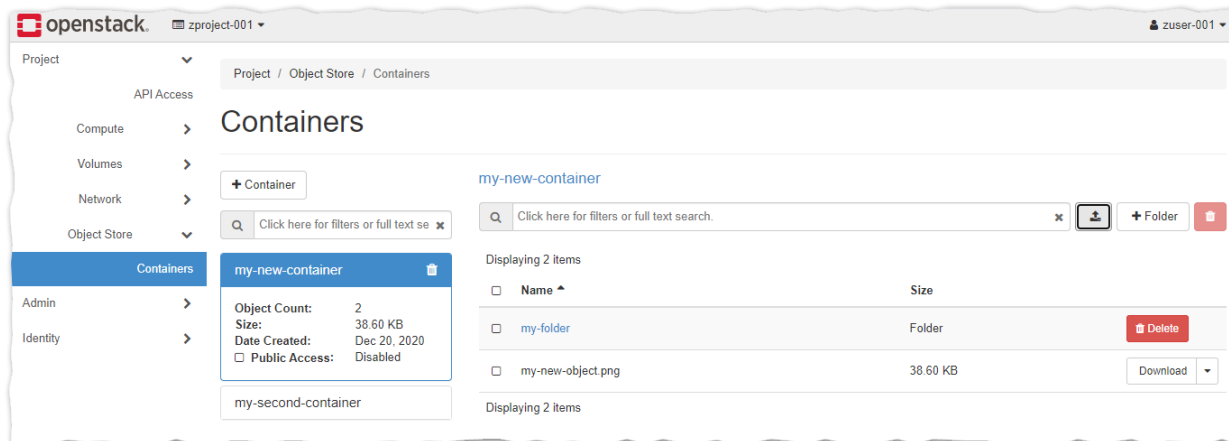
2. Use the provided credentials to access the Object Storage using an S3 client.
3. The S3 Object Storage client should be configured with the VPSA Object Storage endpoint along with the aws credentials that were created in Openstack.

✓ **Note:** Clients that support AWS v4 Signatures will be required to set the Object Storage "Region". The default region in the VPSA Object Storage is us-east-1 and can be modified to match the Openstack region field.

Horizon Dashboard

From the Horizon dashboard, all registered users will be able to execute Object Storage related operations such as:

- Container creation
- Container deletion
- Object Upload/Download/Deletion



6.4.4 Limitations & Known Issues

Limitations

- **18597** - ZIOS_ADMIN account cannot add additional admin users once external authentication is enabled.
- VPSA Object Storage GUI is accessible only by ZIOS_ADMIN/CLOUD_ADMIN (via Zadara Command Center).
- VPSA Object Storage REST API is accessible for ZIOS_ADMIN account only.
- VPSA Object Storage REST API will require local authentication.
- The VPSA Object Storage is caching the remote account and users information to avoid synchronization issues, the update interval is set to 30 minutes.

Known Issues

- **18810** - Modifying the main projects will not be populated to the VPSA Object Storage user interface and not account information will be displayed for the user.
- **18797** - When terminating an account, the VPSA Object Storage account should be deleted prior to the OS account deletion.

MANAGING PERMISSIONS

7.1 Understanding Permissions

VPSA Object Storage provides 2 levels of permissions: Account and Container.

Both permissions types are enforced on account members only, account admins always have all permissions.

Account-level permissions enforce Read (listing) and Write (creating/deleting) option for **containers** under an account.

Container-level permissions enforce Read (list/download) and Write (upload/delete) options for **objects** under a container.

Default Permissions:

An account is created with default account-level permissions that allow all account members to list/create/delete containers in the account.

After an account is created, account-level permissions can be set by a VPSA Object Storage Admin or an Account Admin.

After a container is created, container-level permissions can be set by a VPSA Object Storage Admin or an Account Admin.

7.2 Setting Account Permissions (Account Admin)

Account-level permissions are set in the **Account** view Details pane, and can be set globally for all users in an account or per-user.

The screenshot displays the ZADARA VPSA Object Storage management interface. The left sidebar shows navigation options like Console, Remote Object Storage, and Account Management. The main area shows details for an account named 'public_OSA_58'. Below the details, there are tabs for Permissions, Quotas, Capacity Metering, and Frontend Metering. The 'Permissions' tab is active, showing a table of permissions for 'All Members' and 'Per-user per-account permissions'. A 'Set Permissions' dialog box is open, showing a table with columns for User, List Containers, Create/Delete Containers, Read Objects, and Write/Delete Objects. The 'All Members' row has checkboxes checked for List Containers, Create/Delete Containers, Read Objects, and Write/Delete Objects. The 'Per-user per-account permissions' row has checkboxes unchecked for List Containers, Create/Delete Containers, Read Objects, and Write/Delete Objects. A red arrow points from the 'Per-user per-account permissions' label to the 'Set Permissions' dialog box.

User	List Containers	Create/Delete Containers	Read Objects	Write/Delete Objects
All Members	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Per-user per-account permissions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

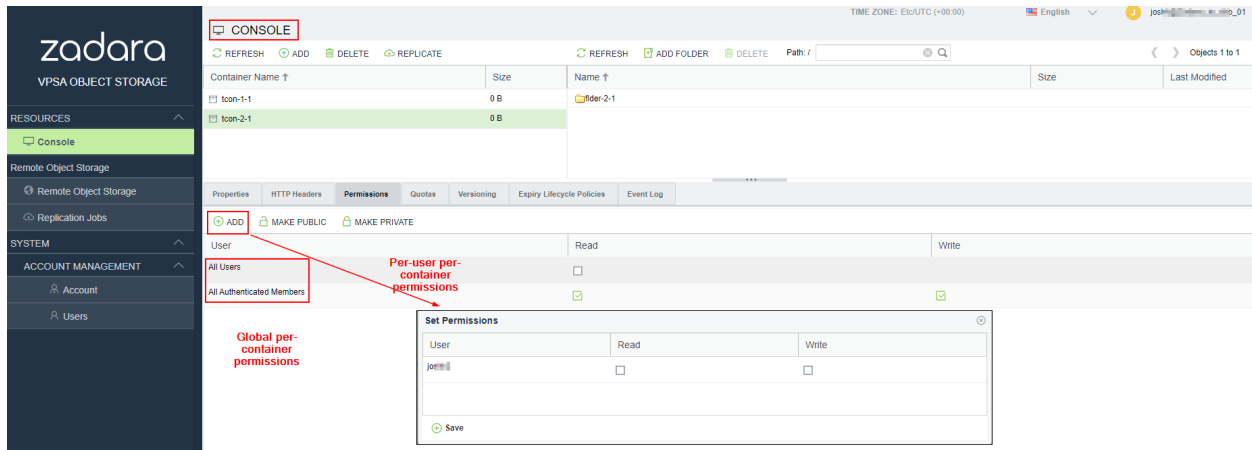
- For global account permissions, check the desired permissions for **All Members** in the details pane at the bottom of the Accounts view and then click **Save**.
- For per-user account permissions, click **Add** in the toolbar on top of the Details pane. In the **Set Permissions** dialogue which opens, individually select the desired permissions per user and then click **Save**.

✔ **Note:**

- When setting permission per-user, existing global permission settings are removed.
- When setting global permissions, existing per-user permissions are removed.

7.2.1 Setting Container Permissions (Account Admin)

Container-level permissions are set in the **Console** view Details pane, and can be set globally for all users in an account or per-user.



- For global container permissions, select the desired container in the Container pane at the top of the Console view. Then select the desired permissions in the Details pane in the **All Users** row or **All Authenticated Members** row and click **Save**.
- For per-user container permissions, click **Add** in the toolbar on top of the Details pane. In the **Set Permissions** dialogue which opens, individually select the desired permissions per user and then click **Save**.

✔ **Note:**

- When setting permission per-user, existing global permission settings are removed.
- When setting global permissions, existing per-user permissions are removed.

✔ **Note:** By making a container public (**Make Public/Private** button) any user can list this container’s objects (using “referral” API) even without permissions for this container.

USAGE REPORTS

a VPSA Object Storage administrator (zios_admin) can create a report with all billing metering information, and export the data into any billing system used. This report uses the pricing information that you have set as described in the [Pricing settings](#) options and in the [Storage Policies \(VPSA Object Storage Admin\)](#) wizard.

To create a Usage Report, first select the Usage Reports view in the left navigation menu (left navigation menu) under System. In the main form select the Account you want to create the report for. (You can also select All to create a report for all accounts). Select the period of time for the report (typically monthly, however custom time range can be selected as well), and click Generate Report.

A high level summary of the report will be displayed, the report can be exported to JSON or CSV format with finer granularity.

The report output is classified according to the following metering services:

1. Capacity - the protected capacity per month (or custom time frame). The protected capacity usage information is the average consumption on the Object Storage policy throughout the selected report time frame (month/custom). The report shouldn't be considered as a capacity snapshot view, as the protected capacity utilization as presented in the report is an average usage sampled on a daily basis. In order to review and generate a current capacity utilization report, the VPSA Object Storage administrator should use the "Export List" option in the **Account Management > Accounts** view.
2. Data In - summary of all ingress traffic (GiB)
3. Data Out - summary of all egress traffic (GiB)
4. Container Replication - summary of all egress traffic used by the internal Container Replication functionality.

8.1 Usage Reports - Exporting a Summary Report

The exported "Summary Report" include a high-level report, with the same granularity as presented in the management GUI.

For the CSV option, the exported report archive include two CSV files:

1. Report header - the general information for the Object Storage and the account such as:
 - VPSA Object Storage ID
 - VPSA Object Storage name and URL
 - VPSA Object Storage Version
 - Pricing information
 - Reporting interval
2. Usage Summary - the actual usage report information:

- Billing units
- Billing sub-category (incoming_bytes, outgoing_bytes and used capacity)
- Container & Object count
- Account information

The JSON option will include all of the above information in a single JSON object.

8.2 Usage Reports - Exporting a Detailed Report

The exported “Detailed Report” include a finer resolution report, that can assist the VPSA Object Storage administrator to break down the usage report to its building block during the requested time frame.

For the CSV option, the exported report archive include two CSV files:

1. Report header - the general information for the Object Storage and the account such as:
 - VPSA Object Storage ID
 - VPSA Object Storage name and URL
 - VPSA Object Storage Version
 - Pricing information
 - Reporting interval
2. Usage - the actual usage report information, with an hour by hour service breakdown:
 - Billing units
 - Billing sub-category (incoming_bytes, outgoing_bytes and used capacity)
 - Container & Object count
 - Account information

VPSA OBJECT STORAGE LOGS

9.1 Access Log (VPSA Object Storage Admin)

Access log lists all operations done by Any user, either using the GUI or the REST API. Each operation is list with all given parameters.

The list can be filtered by:

- User who took the action
- Action type (e.g. create account)
- Date and time

User	Controller	Action	Params	Created on
admin	users	create	{"username": "test_acc_admin", "email": "Oded+1@zadarastorage.com", "role": "account_admin", "account_name": "test_acc", "account_id": "84c920f0eb484265b6851c763ebd66b5", "ui": "true"}	2016-06-28 15:09:59
admin	accounts	create	{"name": "test_acc"}	2016-06-28 15:08:32

9.2 Events Log (VPSA Object Storage Admin)

The events log lists all the events reported by the system. The list can be filtered by severity.

The screenshot shows the VPSA Object Storage Admin interface. The top bar indicates the language is English and the time zone is Asia/Jerusalem (+03:00). The user is logged in as 'admin'. The sidebar on the left contains navigation options: Dashboard, Resources (Drives, Virtual Controllers, Policies, Console, Usage Reports), System (Settings), Account Management (Accounts, Users, Roles, Requests), and Logs (Access Log, Event Log). The main content area is titled 'Event Log' and features a 'Refresh' button and filters for 'Severity: High' and 'Severity: Medium'. Below these is a table of events:

Title	Time
Storage Policy storage-policy-00000002 capacity protection mode changed to Normal.	2016-06-28 15:01:24
Storage Policy 2-way-protection-policy Cluster Health Normal.	2016-06-28 14:40:31
Storage Policy 2-way-protection-policy Cluster Health Normal.	2016-06-28 14:40:31
Storage Policy MetadataPolicy Cluster Health Normal.	2016-06-28 14:39:48
Storage Policy MetadataPolicy Cluster Health Normal.	2016-06-28 14:39:48
Changed password for user admin	2016-06-28 14:36:01
Storage Policy 2-way-protection-policy rebalance successfully finished. Balance 0.050000%, Critical 0.000000%, Degraded 0.000000%	2016-06-28 14:34:40
Storage Policy MetadataPolicy rebalance successfully finished. Balance 0.000000%, Critical 0.000000%, Degraded 0.000000%	2016-06-28 14:34:40
Storage Policy 2-way-protection-policy rebalance started while Cluster Health is Not-Prepared.	2016-06-28 14:34:32
Storage Policy MetadataPolicy rebalance started while Cluster Health is Not-Prepared.	2016-06-28 14:34:30

Below the table, a specific event is selected and its details are shown in a form:

- Severity: 6
- Time: 2016-06-28 14:34:40
- Title: Storage Policy MetadataPolicy rebalance successfully finished. Balance 0.000000%, Critical 0.000000%, Degraded 0.000000%
- Description: (Empty text area)

The interface also shows pagination controls: 'Page 1 of 5' and 'Displaying topics 1 - 12 of 49'.

PERFORMANCE MONITORING

10.1 Understanding Performance Monitoring (VPSA Object Storage Admin)

This section contains high-level overview to monitoring the storage performance. The VPSA Object Storage Performance Monitor allows you to check and monitor the behavior of each element that can affect the overall storage performance, from the single drive/user/account/controller to the whole VPSA Object Storage system.

Each element of the data path can impact the overall performance if not configured and operates properly. The VPSA Object Storage performance Monitor is a tool for pinpointing a storage performance bottlenecks. The following metrics are of interest to measure the performance of a storage system:

- **Bandwidth (Throughput):** This value is how much read or write throughput a certain Resource (disk, policy etc...) delivers. Usually expressed in Megabytes/Second (MB/s)
- **OPs:** IO operations per second, which means the amount of HTTP operations done in one seconds interval. A certain amount of IO operations will also give a certain throughput of Megabytes each second, so these two are related.

Average Object Size x IOPS = Throughput

- **Response time (Latency):** is the time it takes each IO operation to complete. Latency is measured in milliseconds (ms) and should be as low as possible.

10.2 The Performance Monitor

To open the VPSA Performance Monitor, in the left menu navigate to **System > Performance** section.

The performance monitor view consists of the following elements:



1. **Resources Tree:** The Resources Tree lists all the data path objects currently exist in the VPSA Object Storage:

- Policies (data policy and metadata policy including their respective drives)
- Virtual Controllers (grouped by their type)
- Accounts breakdown - Users

2. **Resource Tile:** The Performance Monitor has 1 to 9 resource tiles depending on the chosen layout. Each tile contain either a table or a chart.

3. **Layout Selector:** Toggles between number of supported layout with different number of tiles.

4. **Interval Selector:** Allows switching between different intervals. The interval is a sampling period. Each interval is a single point in the chart. This point represents the average value during that interval.

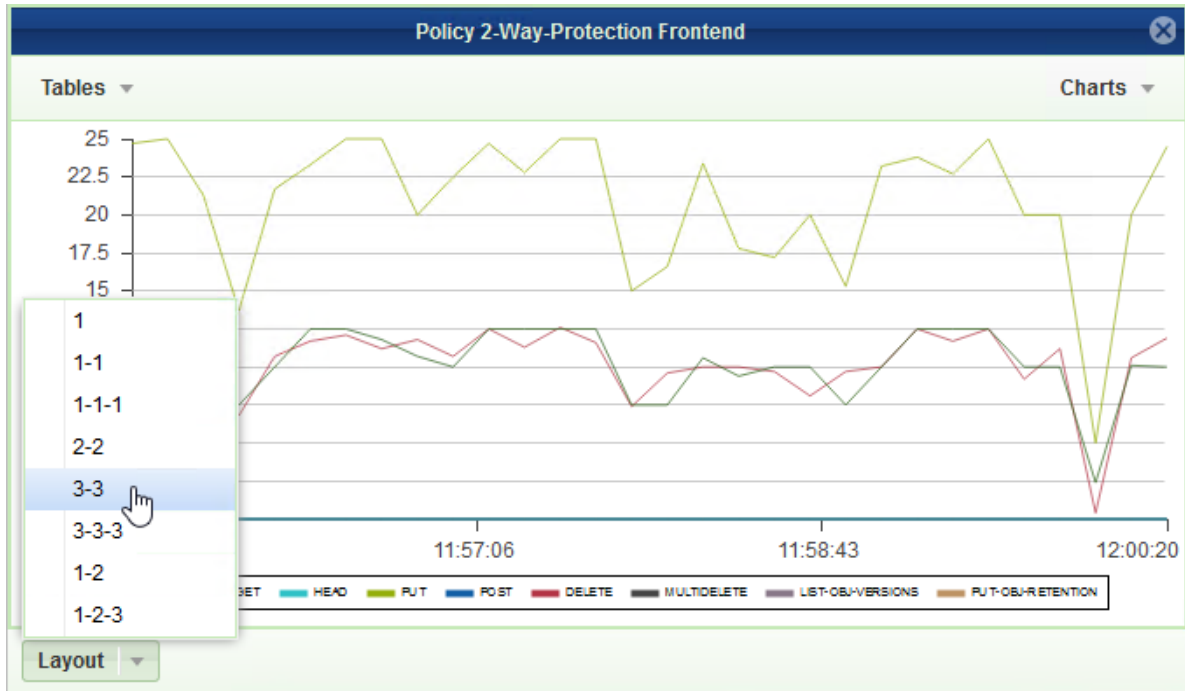
For examples: If 1 minute interval was selected 60 points are displayed, each one is the average value for that specific minute. In total the last 1 hour is displayed.

The interval selection affects all tiles.

10.3 Customizing the Performance Monitor

10.3.1 Customizing the Layout

- Go to VPSA GUI > Performance and click the **Layout** selector

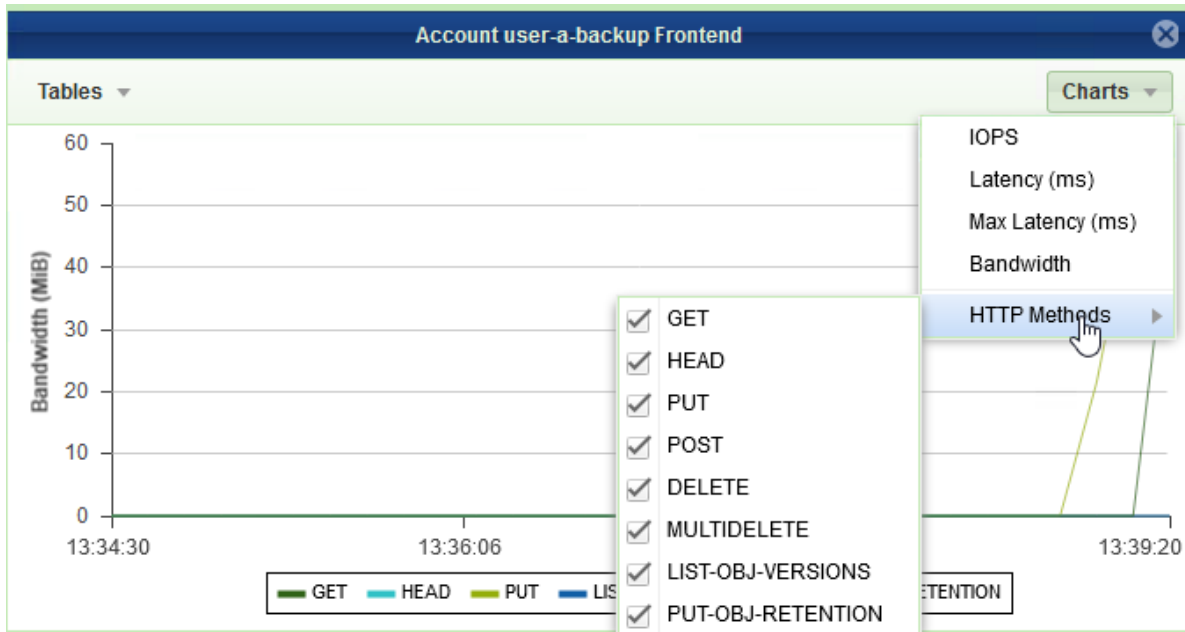


- Select the layout of your choice. Note that if the selected layout has fewer tiles than the original the other tiles will be lost, and should be set again.
- Drag the object of interest from the resources tree, and drop it into a tile. Do the same for all tiles.

10.3.2 Customizing a Tile

Each tile represent a single resource, and provide number of display options related to the specific resource. The display can be either a table of the most current performance figures, or a chart over time of the recent history.

- To display a chart click the **Charts** button on the top right corner of the tile, and select the metric of interest.



10.3.3 Extended metering

The performance metering engine allows the VPSA Object Storage administrator to turn on extended metering capturing on, this enables much detailed view on the IO stack for each client operation.

For common cases, the extended metering is not needed and will be enabled by Zadara support.

In order to enable/disable extended metering - navigate to **System > Settings**, under the General settings view, enable the “Detailed Performance Metering” option.

✓ **Note:** Detailed Performance Metering will be disabled automatically after 30 minutes

VPSA OBJECT STORAGE CONSOLE

VPSA Object Storage Console provides management access for Object Storage accounts. It is not a tool for read/write operations from/to the object storage. With the console, you can create/delete and view containers, and list their content, create and delete folders to better organize the objects, and set permissions and other management configurations.

11.1 The VPSA Object Storage Console Window

The Console Window is built of the following:

1. **Containers pane** - shown on left in diagrams below.
2. **Folders / Objects pane** - shown on right in diagrams below. Note the view shows either folders or objects. Click on a container to display the content folders (**2-fl** in diagram below). Click on a folder to display the content objects (**2-ob** in diagram below). To return from object view to folder view, or in case of nested folders to move back within the folder hierarchy, click on .. above the object pane as shown in diagram below.
3. **Details pane** shown on bottom in diagrams below. Details display shows different properties and permissions depending on whether a container, folder, or object is selected in the top pane.

Folder View

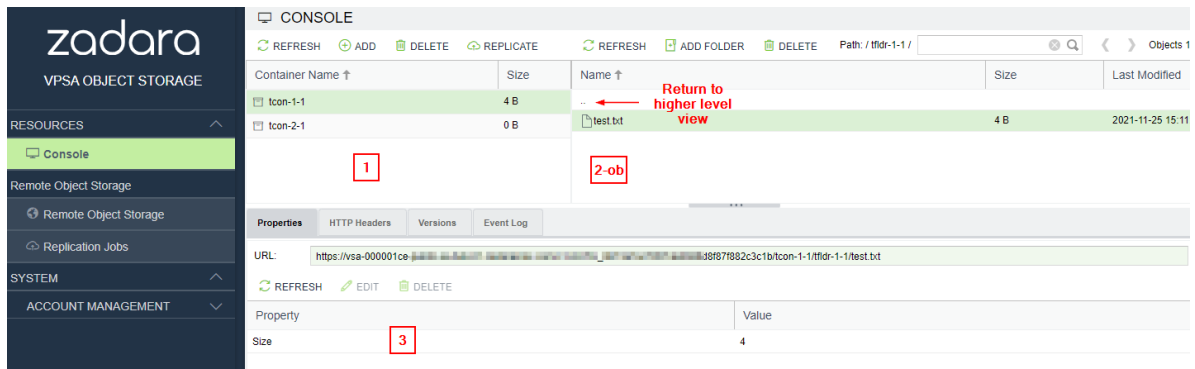
The screenshot shows the ZADARA VPSA Object Storage Console interface. On the left is a dark sidebar with the ZADARA logo and navigation options: RESOURCES (Console), Remote Object Storage, and SYSTEM (ACCOUNT MANAGEMENT). The main area is titled 'CONSOLE' and contains a table of containers:

Container Name ↑	Size	Name ↑	Size	Last Modified
tcon-1-1	4 B	tfldr-1-1		
tcon-2-1	0 B	tfldr-1-2		

Below the table is a 'Properties' pane with tabs for HTTP Headers, Permissions, Quotas, Versioning, Versions, Expiry Lifecycle Policies, and Event Log. The 'Versioning' tab is active, showing a table of properties:

Property	Value
Versioning	True
Storage Policy	2-Way-Protection
Object Count	3
Encrypted	false
Bytes Used	4
Object Lock	False

Object View



11.2 Encrypted Containers

Encryption management of Data-at-Rest (data on the Disk Drives) is applied by the Object Storage on a per-Container basis. Encrypted and unencrypted Containers can coexist in the same account.

A VPSA Object Storage generates a random 256-bit unique Encryption Key per encrypted Container and uses the Advanced Encryption Standard (AES) to encrypt and decrypt the objects data.

The Encryption Keys are stored on disk as ciphertext, using AES with a 256-bit Master Encryption Key, which is generated from a user-supplied **Master Encryption Password**.

The User owns the Master Encryption Password. It is never stored on any persistent media. Instead, only its SHA3 hash-sum is saved on disk for password validation.

Caution: Since the system does not keep the Master Encryption Password, you are **fully responsible to retain and protect the Master Encryption Password**.

During VPSA Object Storage operation, the Master Encryption Password itself is held in kernel memory of the VPSA. Core-dumping any User Mode process within the VPSA will not reveal the Master Encryption Key.

This method ensures that encrypted Data-at-Rest cannot be accessed without explicitly knowing the user-supplied Master Encryption Password, thus providing you full protection if you enable Data-at-Rest Volume encryption.

Caution: The encryption attribute of a Container cannot be changed! If you'd like to encrypt the objects of a non-encrypted Container, or vice versa, you will need to create a new Container and copy the data.

11.2.1 Setting Encryption Password (VPSA Object Storage Admin)

To create a Master Encryption Password, go to the **Settings** page, **Security** tab and click **Edit** in the **Encryption** section. Read the instructions and warning. Enter your password and click **Save**.

Store your Master Encryption Password in a secure place.

11.3 Create Containers

To create a new Container in the account, open the console, and click **Add** in the toolbar above the console pane. The **Create Container** dialogue will open.

Enter the following information:

- **Name** - Enter container name. Note the VPSA Object Storage is both S3 and Swift API protocol compatible. S3 containers are expected to contain only lowercase letters, numbers, periods and dashes. The Swift API is less restrictive; container names can start with any character and contain any pattern. The container name cannot contain a slash (/) character because this character delimits the container and object name. The creation wizard will verify the proposed container name, a warning message will be displayed in case a non-s3 compatible name was chosen. This restriction can be overridden by checking the **Override S3 Naming Rules** option.
- **Storage Policy** - the target storage policy for the container creation
- **Encrypted** - select if container should be encrypted.
- **Object Lock** - selecting object lock will prevent the deletion or modification of any object prior to its retention period expiration. For more information on Object Lock, see [Overview](#).

Click **Create**. The new container will show up in the Containers pane.

11.4 Delete Containers

To remove a container, open the console, go to the containers pane, select the container to be deleted and click **Delete**. The system will prompt you for deletion confirmation.

Note that containers with Object Lock cannot be deleted directly from the console. To do so, please contact your VPSA Object Storage provider. For more information on Object Lock, see [Overview](#).



Caution: After deletion confirmation, the container **with all its content** will be deleted. This operation is permanent and the data can not be recovered.

11.5 Adding folders

By definition, containers are flat and there is no hierarchy structure for storing the objects. However, since many users are accustomed to the folders tree concept of file systems, VPSA Object Storage Console gives you an option to simulate hierarchical structure within the Object Storage Containers.

To create a folder, open the console, select a container in the containers pane, navigate to the hierarchy level where you want to create the new folder, and click **Add Folder**. Give it a name and click **Submit**.

Navigation within the container's folders tree is done in a way similar to the common user experience of file systems explorer. By double clicking a folder, you enter it and see its content (objects and sub-folders). By double clicking the .. at the top of the objects pane, you navigate one level up to the parent Folder. The path indicator above the objects pane always show you current position in the tree.

11.6 Removing folders

To remove a folder, navigate to its parent folder, select the folder to be removed and click **Delete** from the toolbar above the folder pane.

After confirmation, the folder with all its content will be deleted.

11.7 Details Pane

The details pane at the bottom of the console screen includes the following tabs:

- **Properties** - displays read only properties of selected container, folder, or object.
- **HTTP Headers** - display, edit, add, or delete the HTTP headers used in the object storage operations.
- **Permissions** - for information on assigning permissions to containers, see [Setting Container Permissions \(Account Admin\)](#).
- **Quotas** - quotas allow placement of limits on size (in GiB) or count of objects per container (**Console** view) or per account (**Account** view). For more information on quotas, see [Account Quota Management \(VPSA Object Storage Admin or Account Admin\)](#).
- **Versioning** - if enabled, versioning supports storing multiple versions of an object in the same container thus allowing recovery from unintended actions or failures. Note that once versioning is enabled for a container it cannot be disabled.
- **Versions** - displays versions for all folders and objects within a container. Note this tab is only available for containers for which versioning is enabled.
- **Expiry Lifecycle Policies** - allows setting policy to automatically delete object after configurable time. For more information, see [Setting Objects Lifecycle Policy](#).
- **Event Log** - displays log of events related to selected container.

11.8 Setting Objects Lifecycle Policy

Zadara Object Storage supports retention period for objects. The period is set at the object creation time, and the object will automatically be removed when expired. It is possible to set a number of such policies per Container, for different types of objects.

To create a lifecycle policy:

1. In console view, select a container. From the details pane at the bottom, select **Expiry Lifecycle Policies**.
2. Click **Add** from the toolbar in the details pane.
3. In the **Lifecycle Rule** dialogue which opens, enter the following:
 - **Object Expire in (Days)**
 - **Object Names Prefix** - if a prefix is given, only objects with this prefix will be removed by this policy. If no prefix is entered, all objects are affected.
4. Click **Create**.

Note:

- In case a prefix is defined, multiple rules can be defined with different prefixes.

- In case a rule is defined with no prefix, and then a second rule is also defined with no prefix, the second rule replaces the first rule.
- In case a rule is defined and then deleted, or the expiry time is changed, the new policy affects only objects created after the change. Objects created before the policy change will continue to behave as per the policy rules which were in effect at the time of their creation. To change deletion time of an object after creation, you must explicitly modify delete_at header deletion time for the object.

VPSA OBJECT STORAGE SETTINGS

The settings view is visible to administrators of the `zios_admin` account. These collections of settings are system-wide settings:

1. General settings
2. Security
3. Pricing
4. Network

General		
Gradual Policy Expansion:	Drive Addition Step: 10%	Edit
Allow Tenant Name In URL:	No	Edit
Region:	us-east-1	Edit
API Errors Alert:	Status: Enabled; Alert Threshold: 1	Edit
Containers Virtual-Hosted Style Support:	Disabled	Edit
Detailed Performance Metering:	Enabled	Edit
▼ Connectivity Settings - Front End Network		
▼ Connectivity Settings - Public Network		

12.1 General settings

12.1.1 Gradual Policy Expansion

The “Drive Addition Step” will enforce gradual disk addition to a given policy, expanding a data policy gradually will reduce the impact of the Data Policy performance throughout the expansion process. The Object Storage administrator may adjust the drive addition step to expedite the expansion process. (Default: 25%)

12.1.2 Allow Tenant Name In URL

Allow specifying the tenant name (account name) in the URL passed in the API instead of its ID. (Default: No)

Example (account ID):

```
$ wget https://vsa-00000001-mycloud-01.zadara.com/v1/AUTH_8f9388c6dfdb4352ae411e3b4e655850/my-website/cat.png
```

Example (account name):

```
$ wget https://vsa-00000001-mycloud-01.zadara.com/v1/AUTH_webhosting/my-website/cat.png
```

12.1.3 Region

For AWS v4 signature, “region” (also called bucket_location) must be specified for the signature mechanism to work. (Default: us-east-1).

✓ **Note:** In default value of the region setting was changed in VPSA Object Storage version 20.12 from US to us-east-1. VPSA Object Storage that were created prior to that version will not inherit the new region setting automatically.

The region setting should be identical between the the S3 compatible object storage clients and the Object Storage itself.

12.1.4 API Error Alerts

The API Error Alert provides the ability to enable alerts for failed API requests (HTTP Codes 400, 403, 408, 500, 502, 503, 504) and the threshold for such alert.

12.1.5 Containers Virtual-Hosted Style Supported

While virtual-hosted style access is disabled by default, The VPSA Object Storage support both path-style and virtual-hosted style.

In a virtual-hosted-style request, the container name is part of the domain name in the URL. Zadara’s VPSA Object Storage use the following format:

```
https://<container-name>.<object storage id>-<cloud-id>.zadara.com/<key>
```

Example of virtual-hosted style URL:

```
https://office-images.vsa-00000001-mycloud-01.zadara.com/building.png
```

In a path-style URL, the container name will be used as part of the logical path of the URL, as in the following format:

```
https://<object storage id>-<cloud-id>.zadara.com/<container-name>/<key>
```

Example of path style URL:

```
https://vsa-00000001-mycloud-01.zadara.com/office-images/building.png
```

Important: Using Virtual-Hosted style access requires a proper DNS registration and matching SSL certificates, which are handled automatically by the VPSA Object Storage engine. However, if the VPSA Object Storage uses a custom ssl certificate and API hostname, the VPSA Object Storage administrator is required to ensure the compatibility of their certificates and DNS registration.

(Default: disabled)

12.1.6 Detailed Performance Metering

The VPSA Object Storage performance dashboard can display a detailed performance metering information which is useful for troubleshooting performance related issues. The performance dashboard default granularity will be sufficient in most cases, the detailed performance metering is an advanced option.

(Default: disabled)

12.1.7 Connectivity Settings

Each consumer facing network interface is presented in this section (grouped by the network type). This section allows the admin to adjust the API hostname if a custom domain name is needed.

The VPSA Object Storage is provisioned with the Front End network interface, Public IP and additional network interfaces can be assigned to the Object Storage.

Once additional network interfaces were assigned, their connectivity information will be listed.

Public IP: (read only)

An IP address that allows access to the VPSA Object Storage system from the public Internet. Assigning Public IP is done via the Zadara Provisioning Portal, as described in [Assigning Public IPs \(VPSA Object Storage Admin\)](#).

API Endpoint: (read only)

The effective API endpoint address for VPSA Object Storage REST API for all IO requests.

Auth (authentication) Endpoint: (read only)


The effective address for VPSA Object Storage API for authentication requests. The authentication endpoint value is derived from the API hostname.

Starting from version 19.08 the default supported authentication for Openstack Swift client is Keystone v3 authentication.

Important: The support Keystone v2 authentication was deprecated.

API Hostname:

VPSA Object Storage FQDN (fully qualified domain name).

 **Note:** For the VPSA Object Storage API Hostname either static IP, or FQDN must be given.

Floating FE IP: (read only)

The floating frontend IP address used by the Object Storage.

Proxy VC IP: (read only)

The Object Storage Virtual Controllers IP frontend addresses.

Load Balancer Group IP: (read only) List the LBG IP addresses (in case the Elastic Load Balancer is enabled)

12.2 Security settings

12.2.1 Password Policy

The VPSA Object Storage Administrator can control the VPSA Password expiration policy and password history policy.
(Default: disabled)

12.2.2 Dual Factor Authentication

Enforce Dual Factor Authentication for all users. Once enabled, the VPSA Object Storage users will be required to set MFA.
(Default: disabled)

12.2.3 Cloud Admin Access

This sets the cloud administrator VPSA Object Storage management interface ability to access (via Command Center).
(Default: enabled)

12.2.4 Upload SSL Certificate (Optional)

VPSA Object Storage REST API works over HTTPS with SSL certificate. VPSA Object Storage defaults to its built in SSL certificate (issued for zadara.com domain). In case the Object Storage administrator may want to use its own certificate, upload it in this section. The supported certificate format is “PEM”. SSL “PEM” certificate format, as defined in RFCs 1421 through 1424, is a concatenated certificate container files. It is expected that the Object Storage administrator will append the private-key to the certificate prior uploading it.

The resulting PEM should like like this:

```
-----BEGIN RSA PRIVATE KEY-----  
(Your Private Key: your_domain_name.key)  
-----END RSA PRIVATE KEY-----  
-----BEGIN CERTIFICATE-----  
(Your Primary SSL certificate: your_domain_name.crt)  
-----END CERTIFICATE-----  
-----BEGIN CERTIFICATE-----  
(Your Intermediate certificate: Intermediate.crt)  
-----END CERTIFICATE-----  
-----BEGIN CERTIFICATE-----  
(Your Root certificate: RootCertificate.crt)  
-----END CERTIFICATE-----
```

✓ **Note:** Make sure the certificate used is issued for the Hostname or IP specified in VPSA Object Storage endpoints listed above

12.2.5 Encryption

This sets the encryption password for the Object Storage data-at-rest encryption.

For more information on encrypted containers see [Encrypted Containers](#) .

12.2.6 Swift Token Expiration

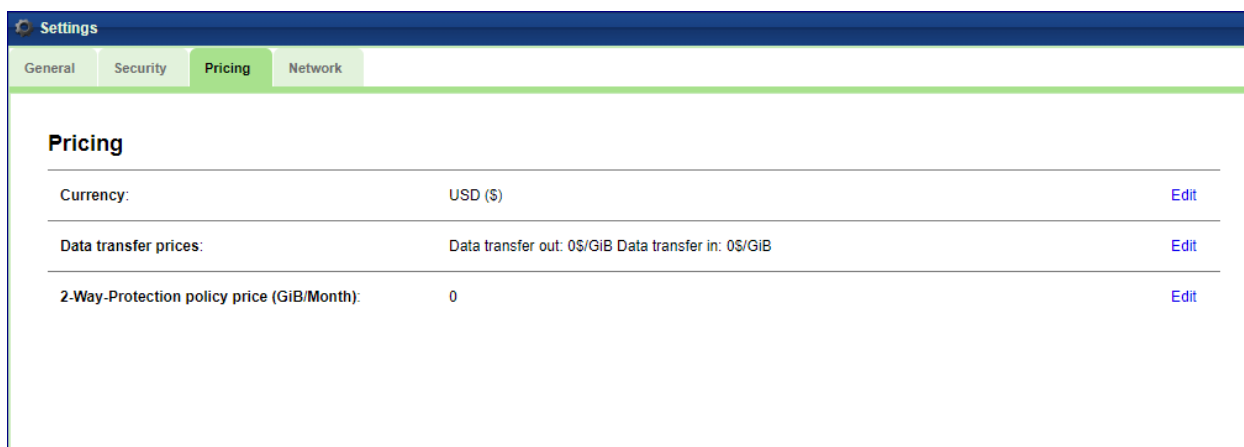
Swift token expiration can be set manually, default is one day (1440 minutes).

12.2.7 SSL Termination

The VPSA Object Storage defaults to HTTPS clients connectivity. The SSL termination is conducted by the internal load balancer. However, in case an external load balancer is used in-front of the VPSA Object Storage, SSL termination can be set to external which will assume HTTP traffic between the external load balancer and the VPSA Object Storage.

(Default: internal)

12.3 Pricing settings



Currency:

Select the currency used for billing purposes. Supported currencies are:

1. USD - USA Dollar
2. GBP - Great Britain Pound
3. EUR - Euro
4. AUD - Australia Dollar
5. KRW - South Korea Won
6. JPY - Japan Yen
7. CNY - China Yuan

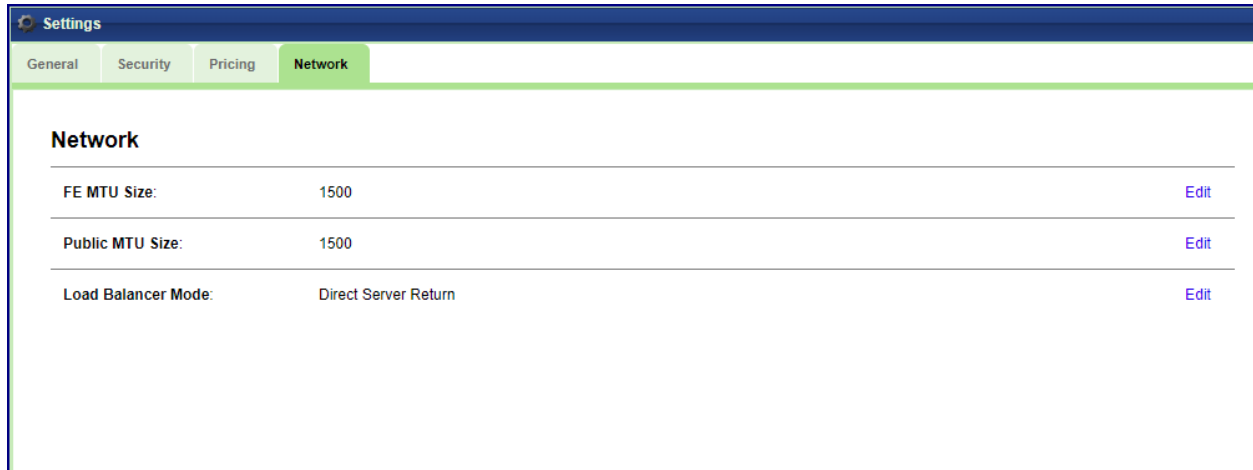
Data Transfer Pricing:

If you want to charge your internal/external customers for the traffic going into and from VPSA Object Storage, you can specify your currency and pricing in the Setting>Pricing tab.

Storage Capacity Pricing:

Pricing for stored capacity depends on the storage Policy used. Therefore the capacity price is set per Policy as the price per GB per month. In case multiple Data Policies exist, a different pricing can be configured for each Data Policy.

12.4 Network settings



Network		
FE MTU Size:	1500	Edit
Public MTU Size:	1500	Edit
Load Balancer Mode:	Direct Server Return	Edit

12.4.1 FE MTU Size

Modify the MTU size for the Frontend interface (1500 - Default, 2048, 4096, 9000)

12.4.2 Public MTU Size

Modify the MTU size for the Public interface (1500 - Default, 2048, 4096, 9000)

12.4.3 Load Balancer Mode

Toggle the internal load balancer & Zadara Elastic Load Balancer mode of operation:

- **Direct Server Return (default)** - Recommended for scale. Packets from the Object Storage Virtual Controller bypass the load balancer, maximizing the egress throughput.
- **NAT** - The load balancer will be used as a gateway for all traffic from /to the object storage virtual controller.



Warning: Changing the Load Balancer mode of operation can be disruptive for existing clients workload.

12.4.4 Custom DNS Servers

A custom (private) DNS server can be set to allow proper name resolution of private domain names, this setting is useful while working with a Remote Authentication Provider.

- Custom name servers name server IP, comma separated
- DNS lookup domain (optional) - set the explicit domain name that will be searched using the custom name server

VPSA OBJECT STORAGE NETWORK DIAGNOSTICS

This view allow the VPSA Object Storage administrator to perform connectivity checks from within the VPSA Object Storage itself throughout his servers/networking devices.

Diagnostics

Network Diagnostics

Interface: Frontend - 2003:cdba::3256:17

Target Address: * 2003:cdba::3256:1

Ping:

Count: 3

Traceroute:

Run

Output

```
PING 2003:cdba::3256:1(2003:cdba::3256:1) from 2003:cdba::3256:17 : 56 data bytes

--- 2003:cdba::3256:1 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 2071ms
```

Clear

Interface: Select the source interface of the VPSA Object Storage (Frontend, Public IP)

Target Address: IPv4 (or IPv6) of the target network device/server.

Ping: Checkbox - perform a ping test (count - number of echo requests to send).

Traceroute: Checkbox - Perform a traceroute scan to the target host.

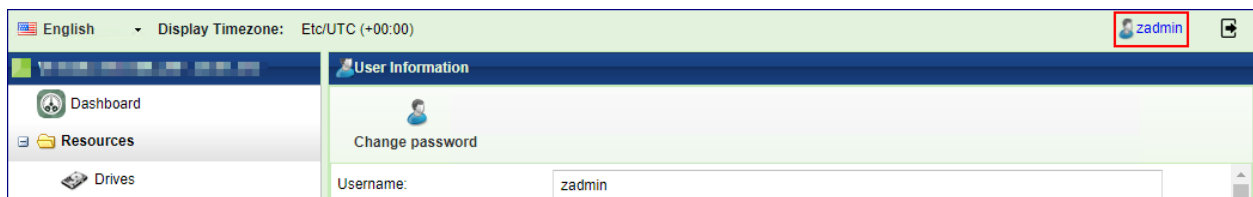
OBJECT STORAGE CLIENTS - CONFIGURATION

Standard client tools can be used to browse objects in VPSA Object Storage. This Appendix will help configuring Object Storage Client Tools to work against VPSA Object Storage. In order to access the VPSA Object Storage the client tool must be configured with the user's authentication credentials.

The VPSA Object Storage support two API interfaces:

1. Openstack Swift API
2. AWS S3 API

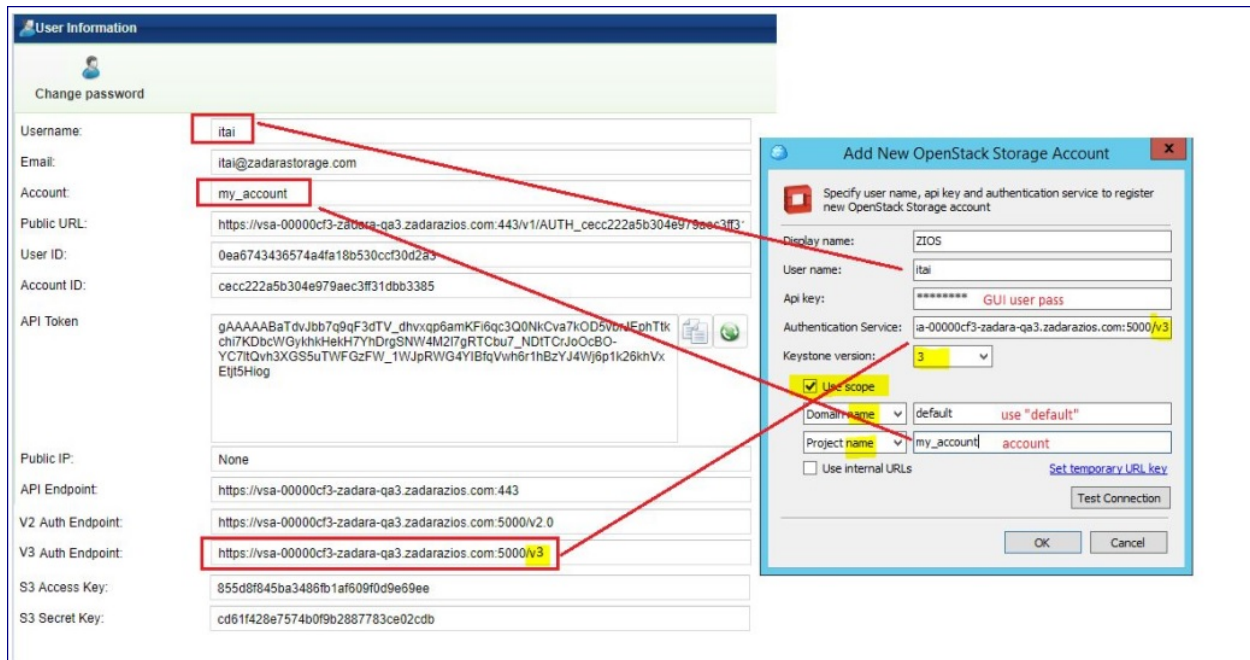
The Needed parameters can be found in the Object Storage User Information page. Information about the user currently logged in to the Object Storage GUI is displayed by clicking the user name on the GUI upper right corner.



14.1 Openstack Swift Interface

14.1.1 Cloudberry Explorer for OpenStack (v3 authentication)

Use the logged-in User Information properties to set the authentication fields of Cloudberry Explorer



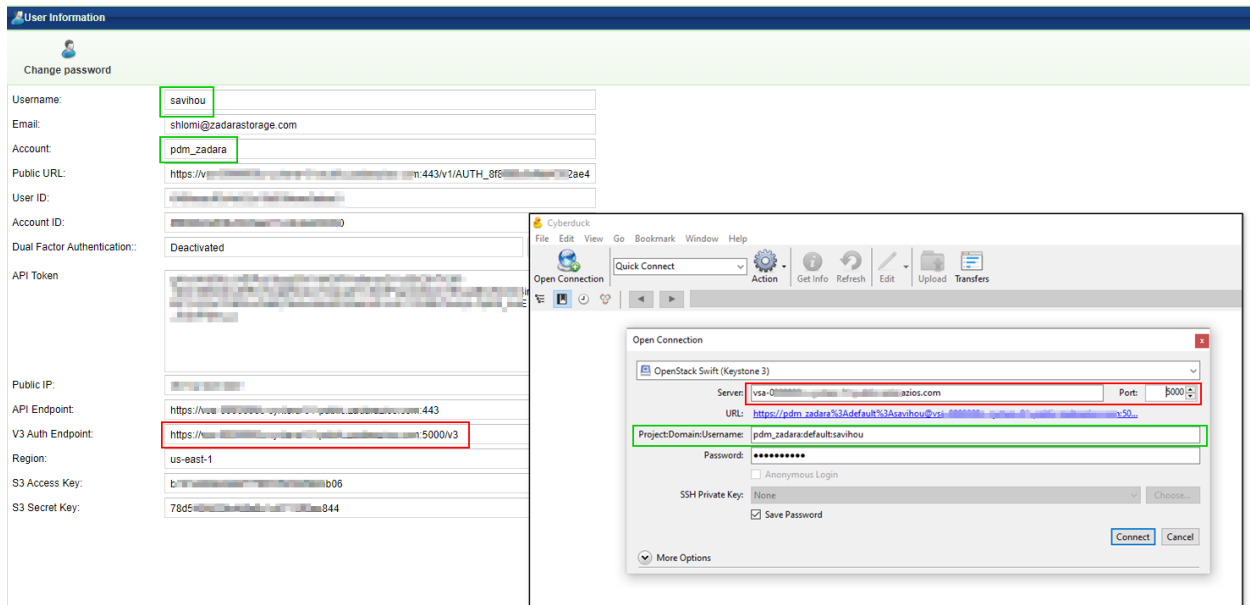
14.1.2 CyberDuck

Cyberduck version: 7.7.1 (33788)

Cyberduck client support "Openstack Swift (Keystone 3)" API interface.

Use the logged-in User Information properties to set the authentication field of CyberDuck client.

1. Server - the VPSA Object Storage v3 Auth Endpoint.
2. Port - 5000
3. Project:Domain:Username - <VPSA Object Storage Account>:default:<VPSA Object Storage Username>



14.1.3 cURL (swift API)

cURL can be used for Object Storage operations. The connectivity information is available in the User Information view.

In this example, we will use the API Token and Account URL in order to create a new container:

```
$ curl -H "x-auth-token: <user_token>" -X PUT <account_url>/test-bucket1/
$ URL=https://vsa-00000001-mycloud-01.zadara.com:443/v1/AUTH_123456789
$ TOKEN=<MYAPI_TOKEN>
$ curl -H "x-auth-token: $TOKEN" -X PUT $URL/test-bucket1/
```

Important: By default, the API token is valid for 24 hours. the preferred option to identify/renew the API token via an API call is to use a Swift command and not the VPSA Object Storage command indicated in the Zadara VPSA Object Storage REST API User Guide here: <http://zios-api.zadarastorage.com>.

The following example describes how to get the token programmatically using the Swift API:

```
$ curl -i -H "Content-Type: application/json" \
-d '{ "auth": \
{ "identity": { "methods": ["password"], "password": \
{ "user": { "name": "<USERNAME>", "domain": { "id": "default" }, \
"password": "<USER PASSWORD>" } } }, "scope": { "project": \
{ "name": "<ACCOUNT_NAME>", "domain": { "id": "default" } } } }' \
"https://vsa-00000001-mycloud-01.zadara.com:5000/v3/auth/tokens" ;
```

and use the returned token for the subsequent API calls.

```
HTTP/1.1 201 Created
Date: Thu, 19 Nov 2020 16:05:28 GMT
Server: Apache/2.4.29 (Ubuntu)
Content-Length: 1114
X-Subject-Token: gAAAAABftpfIAiuo2tRZP8VVtomU1knVG7xNU0NV4b2u...
```

Additional examples of using the Openstack Swift API can be found at the [Openstack Swift API documentation](#)

14.2 AWS S3 Compatible clients

14.2.1 Supported S3 APIs

The VPSA Object Storage is utilizing Openstack Swift's S3 Middleware. As S3 is an AWS product, It includes some features that are AWS oriented and are outside of the scope of Zadara's Object Storage offering.

The list of supported S3 operations can be found in the [S3/Swift REST API Comparison Matrix](#).

Zadara have added a specific support for:

- Versioning.
- Object Retention Support.

14.2.2 Authentication information

For Object Storage connectivity, it is required to gather the following information from the VPSA Object Storage management UI:

1. VPSA Object Storage Endpoint
2. VPSA Object Storage region.
3. S3 API Access Key/Secret Key

In the VPSA Object Storage GUI, navigate to the User Information section (top right corner, by clicking the logged in username).

The screenshot displays the 'User Information' page in the VPSA Object Storage GUI. The user 'shlomi' is logged in, as indicated by the red arrow pointing to the username in the top right corner. The page shows the following information:

Username:	shlomi
Email:	shlomi@zadara.com
Account:	backup
Public URL:	https://vsa-0000003f-zadara-iop-01.zadarazios.com:443/v1/AUTH_c9b8e9ca18824068965d7
User ID:	67893a5622be47b887e0776443351221
Account ID:	c9b8e9ca18824068965d7a13968f05cc
Dual Factor Authentication:::	Deactivated ➔ Activate
API Token	gAAAAABeyhYxJRFXhGWIItr3_8Gu2H60I9cyrTDGgiyB9NootM4kAGRuEMsGBRwYbHpW8-JDnSiRcdxWSEpZpjCII8AGwS_BIqRihFMFuiHE9BvGxqVyc_yQrQxG4HZnzUfN5bqRsZlpVe4dOid51FzEYsGxX66Vzqz-DILAuw7NnJ36B3Yxs
Public IP:	None
API Endpoint:	https://vsa-0000003f-zadara-iop-01.zadarazios.com:443 1
V3 Auth Endpoint:	https://vsa-0000003f-zadara-iop-01.zadarazios.com:5000/v3
Region:	us-east-1 2
S3 Access Key:	74a8cb9470e546dd965af3aaaac788a9 3
S3 Secret Key:	0668f56d4b4a43b582d64a7bb2dbd565

14.2.3 S3 Browser

S3 Browser can be used to administrate and perform object operations against Zadara's VPSA Object Storage. The account information in S3 Browser should be configured according to the following example (S3 Compatible Storage):

Edit Account [online help](#)

Edit account details and click Save changes

Account Name:

 Assign any name to your account.

Account Type:

 Choose the storage you want to work with. Default is Amazon S3 Storage.

REST Endpoint:

 Specify S3-compatible API endpoint. It can be found in storage documentation. Example: rest.server.com:8080

Access Key ID:

 Required to sign the requests you send to Amazon S3, see more details at <https://s3browser.com/keys>

Secret Access Key:

 Required to sign the requests you send to Amazon S3, see more details at <https://s3browser.com/keys>

Encrypt Access Keys with a password:

 Turn this option on if you want to protect your Access Keys with a master password.

Use secure transfer (SSL/TLS)
 If checked, all communications with the storage will go through encrypted SSL/TLS channel

[Advanced S3-compatible storage settings](#)

Once the Endpoint and authentication details are configured properly, click on the Advanced S3-compatible storage settings

In the advanced settings select the following:

1. Signature version - Signature V4
2. Addressing model - Path style

3. Override storage regions - specify the VPSA Object Storage region name; the format is **Region Name=<region name>**.

Close and save the account information.

✓ **Note:** S3 Browser client is hard-coded to use **us-east-1** as the default region, In order to use Object Storage v4 signatures, ensure the same region value is configured in your VPSA Object Storage or override the default S3Browser region name in the Advanced Settings options.

14.2.4 S3cmd

The credentials can be retrieved from the VPSA Object Storage logged in “User Information” properties.

/etc/.s3cfg

```
[default]
access_key = <S3 Access Key>
secret_key = <S3 Secret Key>
host_base = vsa-00000001-cloud-01.zadara.com
host_bucket = vsa-00000001-cloud-01.zadara.com
use_https = True
```

✓ **Note:**

- **access_key** is the user S3 Access Key
 - **secret_key** is the user S3 Secret Key
 - **host_base** is the HTTPS path to the VPSA Object Storage being accessed
-

14.2.5 AWS Command Line Interface

Update the default/create new profile for the VPSA Object Storage within aws configuration file.

~/.aws/config

```
[profile zadara]
s3 =
    signature_version = s3v4
```

✓ **Note:** It is possible to use both AWS v4/v2 signatures with S3-compatible storage such as Zadara VPSA Object Storage.

~/.aws/credentials

```
[zadara]
aws_access_key_id = <S3 Access Key>
aws_secret_access_key = <S3 Secret Key>
```

The credentials can be retrieved from the VPSA Object Storage logged in “User Information” properties.

Example of usage:

```
$ aws s3 --profile=zadara --endpoint-url=https://vsa-00000001-cloud-01.zadara.com --region=US ls s3://
↳ zadara-test

2018-04-01 19:00 mytestfile1
2018-04-01 19:10 mytestfile2
2018-04-01 19:20 mytestfile3
```

✓ **Note:**

- `profile` is the name of the credentials and config profile specified above (in this case, “zadara”)
- `endpoint-url` is the HTTPS path to the VPSA Object Storage being accessed
- `region` should match the Region defined in the VPSA Object Storage [settings page](#)

14.2.6 boto3 python library

Update the default/create new profile for the VPSA Object Storage within aws configuration file.

~/aws/config

```
[profile zadara]
s3 =
    signature_version = s3v4
```

✓ **Note:** It is possible to use both AWS v4/v2 signatures with S3-compatible storage such as Zadara VPSA Object Storage.

~/aws/credentials

```
[zadara]
aws_access_key_id = <S3 Access Key>
aws_secret_access_key = <S3 Secret Key>
```

The credentials can be retrieved from the VPSA Object Storage logged in “User Information” properties.

In your python code:

```
#!/usr/bin/env python

import boto3

session = boto3.session.Session(profile_name='zadara')

s3_client = session.client(
    service_name='s3',
    region_name='US',
    endpoint_url='https://vsa-00000001-cloud-01.zadara.com',
)

print('Buckets')
print(s3_client.list_buckets())

print('')
```

(continues on next page)

(continued from previous page)

```
print('Objects')
print(s3_client.list_objects(Bucket='test'))
```

✓ **Note:**

- `profile_name` is the name of the credentials and config profile specified above (in this case, “zadara”)
 - `endpoint_url` is the HTTPS path to the VPSA Object Storage being accessed
 - `region` should match the Region defined in the VPSA Object Storage [settings page](#)
-

14.2.7 AWS S3 Java SDK (aws-java-sdk)

AWS Provides a comprehensive S3 Java SDK that can be used with Zadara’s VPSA Object Storage. Getting started guide is available in Zadara’s Support Knowledge Base article - [How to use AWS S3 Java SDK with VPSA Object Storage](#).

14.2.8 AWS S3 PHP SDK (aws-sdk-php)

AWS Provides a comprehensive S3 PHP SDK that can be used with Zadara’s VPSA Object Storage. Getting started guide is available in Zadara’s Support Knowledge Base article - [How to use AWS S3 PHP SDK with VPSA Object Storage](#).

14.2.9 AWS S3 JavaScript SDK (aws-sdk)

AWS Provides a comprehensive S3 JavaScript SDK that can be used with Zadara’s VPSA Object Storage. Getting started guide is available in Zadara’s Support Knowledge Base article - [How to use AWS S3 JavaScript SDK with VPSA Object Storage](#).

LOAD BALANCER

VPSA Object Storage is created by default with internal load balancer to distribute object operations between the proxy virtual controllers (VCs). Any VPSA Object Storage is provisioned with a built-in Load Balancer (referred as Internal Load Balancer) solution which will work seamlessly out of the box. For large (multi-PB) deployments, the VPSA Object Storage administration may want to consider using either:

1. Dedicated Load Balancer (software/hardware) appliance in-front of the Object Storage in order to gain full control on the balancing mechanism, traffic policy and security protocols.
2. Integrate the application directly with the VPSA Object Storage.

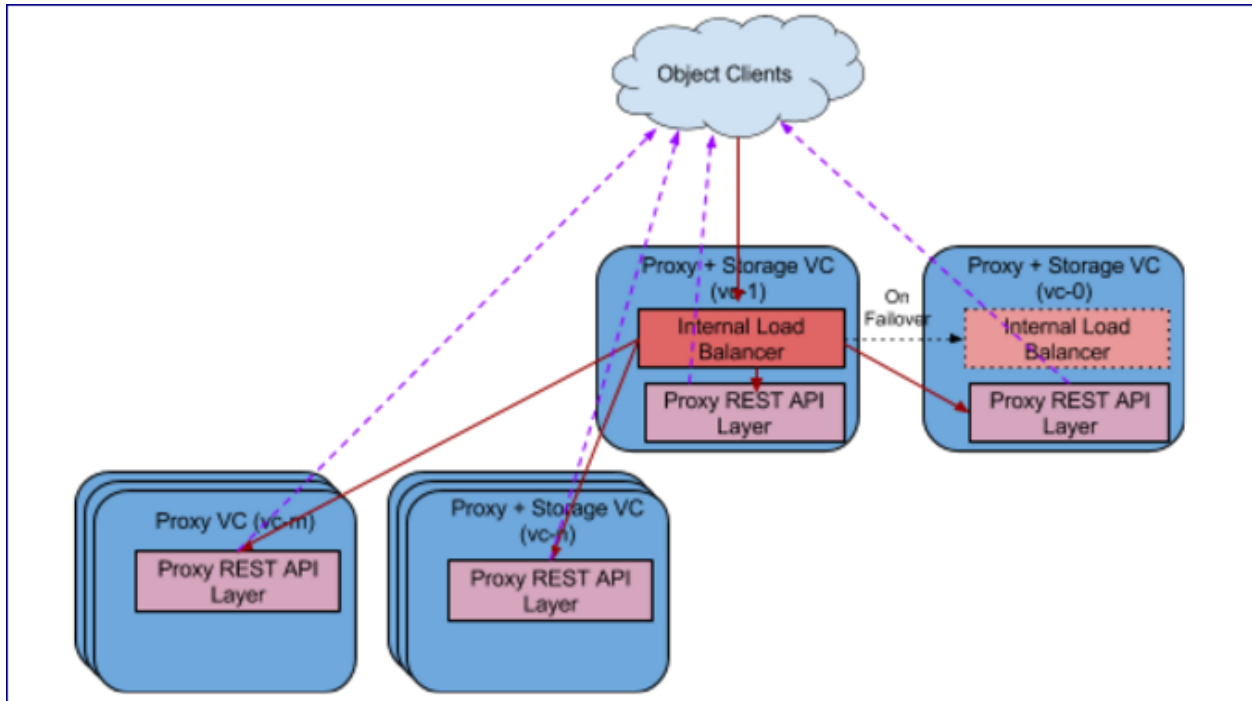
A multi-PB VPSA Object Storage deployments will handle dozens or even hundreds of Virtual Controllers which will be challenging to manage using an external Load Balancer or via application integration. In order to simplify the management overhead it is possible to enable a dedicated Load Balancer (Elastic Load Balancer).

15.1 ZELB (Zadara Elastic Load Balancer)

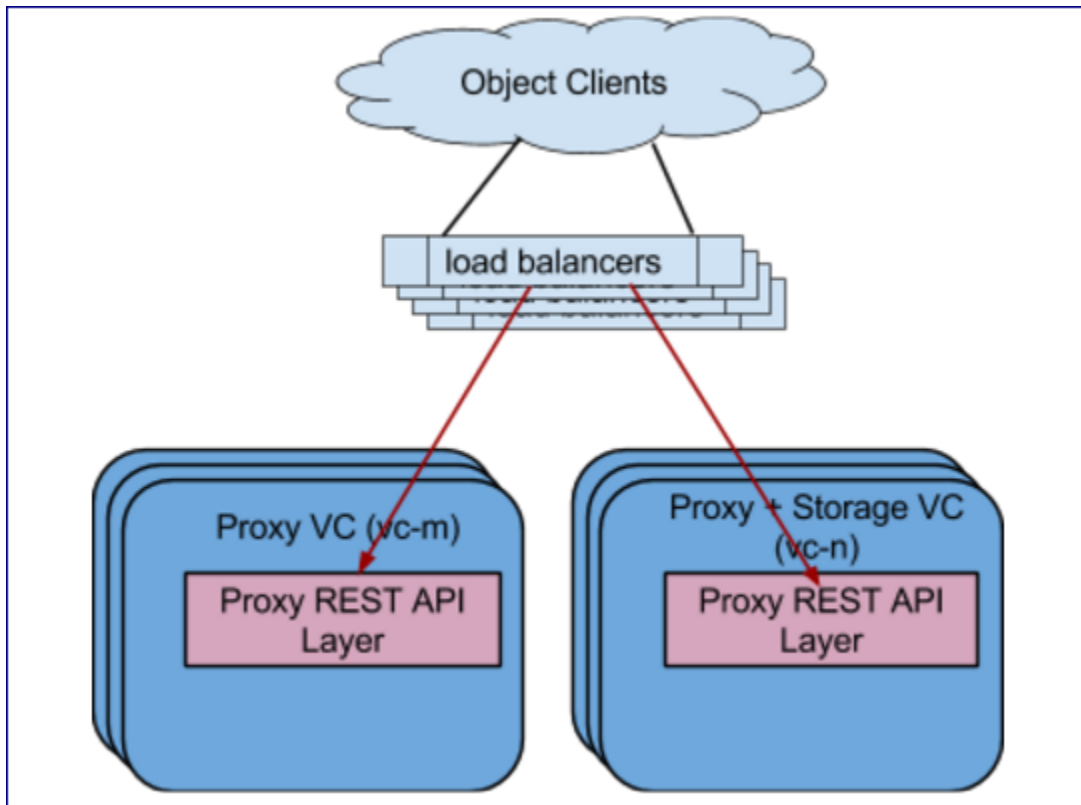
Elastic Load Balancer will break down the Virtual Controllers into groups of 12 VCs. For each Elastic Load Balancer Group (ZELBG) two additional HA Proxy VCs will be provisioned.

cluster scales out and connections load is increasing, switching to an external load balancer might be required.

VPSA Object Storage provides a very smooth and easy way to switch between internal and external load balancer setups.



Internal Load Balancer runs in one of the VC's



External Load Balancer(s) runs outside of the VPSA Object Storage VC's

Below are instructions for setting up an external load balancer to terminate SSL connections and distribute the load over all VC's.

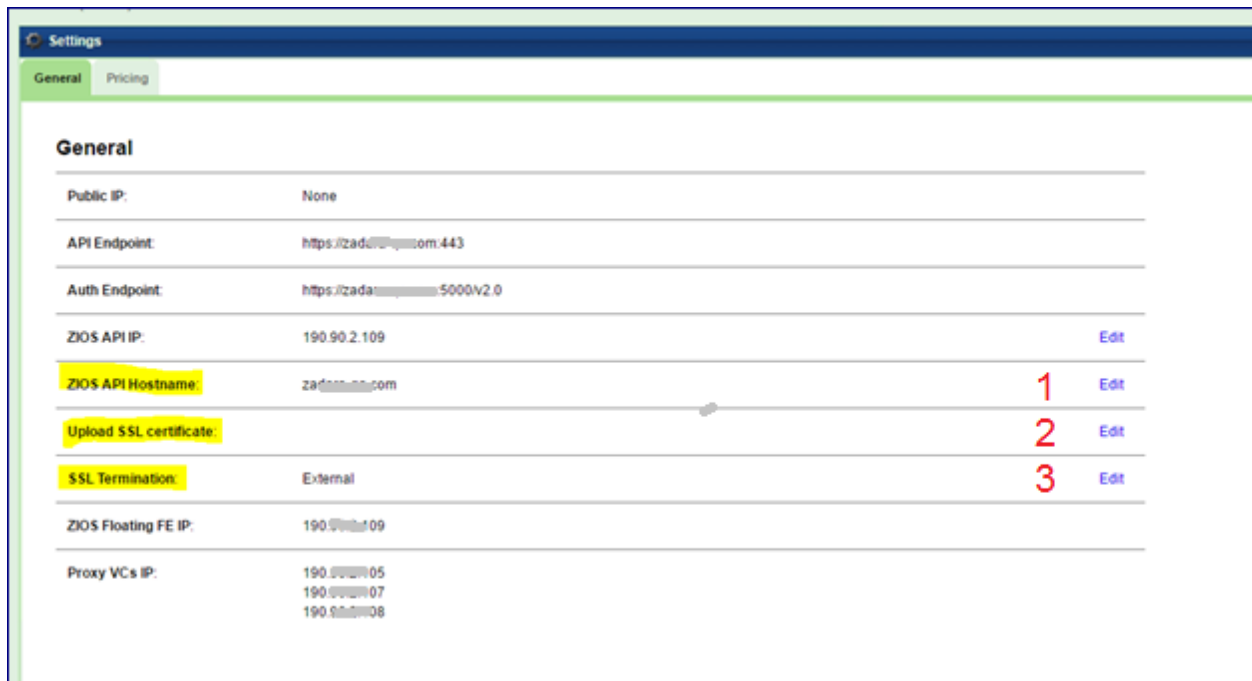
There are many load balancer solutions in the market, setting them all up is quite similar procedure. This appendix gives an example of HAProxy, an open-source TCP/HTTP load-balancing proxy server that can be found in www.haproxy.org

The recommended configuration below will allow the following:

- SSL Termination is done on the external load balancer for both object operation API's and GUI connections. Authentication connections are always terminated in Object Storage.
- Custom SSL certificate (PEM) located on the load balancer is used for SSL connections
- Object operation connections are redirected to VPSA Object Storage proxy VC's
- Object operation connections are distributed between VC's unevenly (proxy-only VCs to take more load than storage VC's, and HA VCs to take the lowest load)
- Redirected object operation connections will include the original client IP in a special header added by the load balancer (for logging in VPSA Object Storage proxy)
- HTTP-based health check is performed by the load balancer to probe all VPSA Object Storage proxy VC's
- Authentication connections are redirected to ZObject Storage floating IP (SSL pass-through terminated on the VPSA Object Storage, Custom SSL certificate must be uploaded to the VPSA Object Storage as well).
- GUI connections are redirected to the VPSA Object Storage floating IP
- Graphical statistics interface is enabled on the load balancer

Apply the following configuration to your VPSA Object Storage Settings:

1. Set the internet-facing domain-name/IP of the external LoadBalancer as VPSA Object Storage API Hostname / IP (zadara-qa.com which resolves to the external LB IP 180.80.2.217, is set in this example as VPSA Object Storage API Hostname)
2. Upload your custom SSL certificate (will be used for authentication connections). The certificate should match the custom domain name.
3. Set SSL Termination to "External"



HAProxy Installation and configuration instructions:

- Install HAProxy:

```
sudo add-apt-repository -y ppa:vbernat/haproxy-1.5

sudo apt-get update

sudo apt-get install -y haproxy
```

- **Upload your custom SSL certificate to HAProxy server.** In this example the certificate PEM file is placed under `/etc/ssl/private/zadara_custom.pem`
- Edit `/etc/haproxy/haproxy.cfg` to include the following:

```
| global
|   maxconn 2048
|   log /dev/log      local0
|   log /dev/log      local1 notice
|   chroot /var/lib/haproxy
|   stats socket /run/haproxy/admin.sock mode 660 level admin
|   stats timeout 30s
|   user haproxy
|   group haproxy
|   daemon
|   tune.ssl.default-dh-param 2048
|   # Default SSL material locations
|   ca-base /etc/ssl/certs
|   crt-base /etc/ssl/private
|   # Default ciphers to use on SSL-enabled listening sockets.
|   # For more information, see ciphers(1SSL). This list is from:
|   # https://hynek.me/articles/hardening-your-web-servers-ssl-ciphers/ssl-default-bind-ciphers
|   ECDH+AESGCM:DH+AESGCM:ECDH+AES256:DH+AES256:ECDH+AES128:DH+AES:
RSA+3DES:!aNULL:!MD5:!DSS
|   ssl-default-bind-options no-ssl3
|
| defaults
|   log          global
|   mode         http
|   option       httplog
|   option       dontlognull
|   timeout     connect 5000
|   timeout     client  50000
|   timeout     server  50000
|   errorfile   400 /etc/haproxy/errors/400.http
|   errorfile   403 /etc/haproxy/errors/403.http
|   errorfile   408 /etc/haproxy/errors/408.http
|   errorfile   500 /etc/haproxy/errors/500.http
|   errorfile   502 /etc/haproxy/errors/502.http
|   errorfile   503 /etc/haproxy/errors/503.http
|   errorfile   504 /etc/haproxy/errors/504.http
|   frontend   fe-object-operations
|   bind       180.80.2.217:443 ssl crt /etc/ssl/private/zadara\_custom.pem
|   mode       http
|   default\_backend be-zios-object-operations
|
| frontend fe-auth
|   bind       180.80.2.217:5000
|   option     tcplog
|   mode       tcp
```

(continues on next page)

(continued from previous page)

```

|   default\_backend be-floating-zios-auth
|
| frontend fe-gui
|   bind 180.80.2.217:8443 ssl crt /etc/ssl/private/zadara\_custom.pem
|   mode http
|   default\_backend be-floating-zios-gui
|
| backend be-zios-object-operations
|   mode http
|   balance roundrobin
|   option forwardfor
|   option httpclose
|   option httpchk HEAD /healthcheck HTTP/1.0
|   server ziosStorageProxy0 190.90.2.102:8080 weight 10 check
|   server ziosStorageProxy1 190.90.2.104:8080 weight 10 check
|   server ziosStorageProxy2 190.90.2.114:8080 weight 50 check
|   server ziosProxyOnly3 190.90.2.106:8080 weight 100 check
|   server ziosProxyOnly4 190.90.2.109:8080 weight 100 check
|
| backend be-floating-zios-auth
|   mode tcp
|   server ziosFloating 190.90.2.118:5000
|
| backend be-floating-zios-gui
|   mode http
|   server ziosFloating 190.90.2.118:80
|
| listen stats \*:1936
|   stats enable
|   stats uri /
|   stats auth zadara:zadara

```

- Enable HAProxy logging (Optional)

a. Edit rsyslog conf:

```

| sudo vi /etc/rsyslog.conf
| # provides UDP syslog reception
| $ModLoad imudp
| $UDPServerRun 514
| # provides TCP syslog reception
| $ModLoad imtcp
| $InputTCPServerRun 514

```

b. Restart the service:

```
sudo service rsyslog restart
```

- Restart HAProxy service:

```
sudo service haproxy restart
```

- Monitor statistics by browsing to <http://<HAProxy server IP>:1936/> Credentials: zadara/zadara

APPENDIX B: LARGE OBJECT SUPPORT

16.1 Overview

VPSA Object Storage has a 5GB limit on the size of a single uploaded object. However, the download size of a single object is virtually unlimited with the concept of segmentation. Segments of the larger object are uploaded and a special manifest file is created that, when downloaded, sends all the segments concatenated as a single object. This also offers much greater upload speed with the possibility of parallel uploads of the segments.

16.2 Dynamic Large Objects

VPSA Object Storage is providing Dynamic Large Object (DLO) support via a dedicated middleware.

It is possible to upload file at any size as long as it is segmented into segments smaller than 5GB.

It's the responsibility of the object operation client tool to break a file into segments, different tools can use different size of segments.

16.2.1 Failed upload handling

In case the multipart upload doesn't complete, the VPSA Object Storage will not assemble the object parts and will not create any object. The parts will remain stored in the Object Storage for a period of 15 days, this until the Object Storage segment tracker will cleanup automatically the orphan parts. In this case aborted/failed uploads incomplete parts will be considered as part of the account used capacity.

16.2.2 S3 Interface

Most S3 clients tools support large objects handling, and operation is transparent to the user.

16.2.3 Swift Interface

Using the Swift Tool included with the python-swiftclient library, you can use the -S option to specify the segment size to use when splitting a large file. For example:

```
swift upload test\_container -S 1073741824 large\_file
```

This would split the large_file into 1G segments and begin uploading those segments in parallel. Once all the segments have been uploaded, swift will then create the manifest file so the segments can be downloaded as one.

So now, the following swift command would download the entire large object:

```
swift download test\_container large\_file
```

swift command uses a strict convention for its segmented object support. In the above example it will upload all the segments into a second container named test_container_segments.

APPENDIX C: OBJECT STORAGE IMMUTABILITY (S3 OBJECT LOCK)

17.1 Overview

Zadara Object Storage Immutability ensures data integrity by stopping stored objects from being deleted or overwritten during a specific retention timeframe. With Object Storage Immutability (Object Lock) enabled on a container, it is impossible to modify or shorten the retention period for an existing object. Immutability ensures object version integrity and availability throughout the defined retention period.

This feature can be leveraged directly from the S3 Compatible backup software (i.e. Veeam v10) to ensure the integrity and availability of the backup as required. A configuration guide for [SOBR\(Scale-Out Backup Repository\)](#) that leverages Veeam's Immutability feature can be found in Zadara's Knowledge-Base portal.

17.2 S3 Object Lock

The VPSA Object Storage is utilizing the S3 Object Lock feature (Compliant Mode) in order to set a retention period to a given object and mark it as an immutable object. Deleting this object will be blocked until the retention period has expired. Object Lock should be enabled during the creation time of a new container directly from the management interface or by using AWS S3 Tools (CLI/SDK). Please note that Object-Lock cannot be enabled for existing containers.

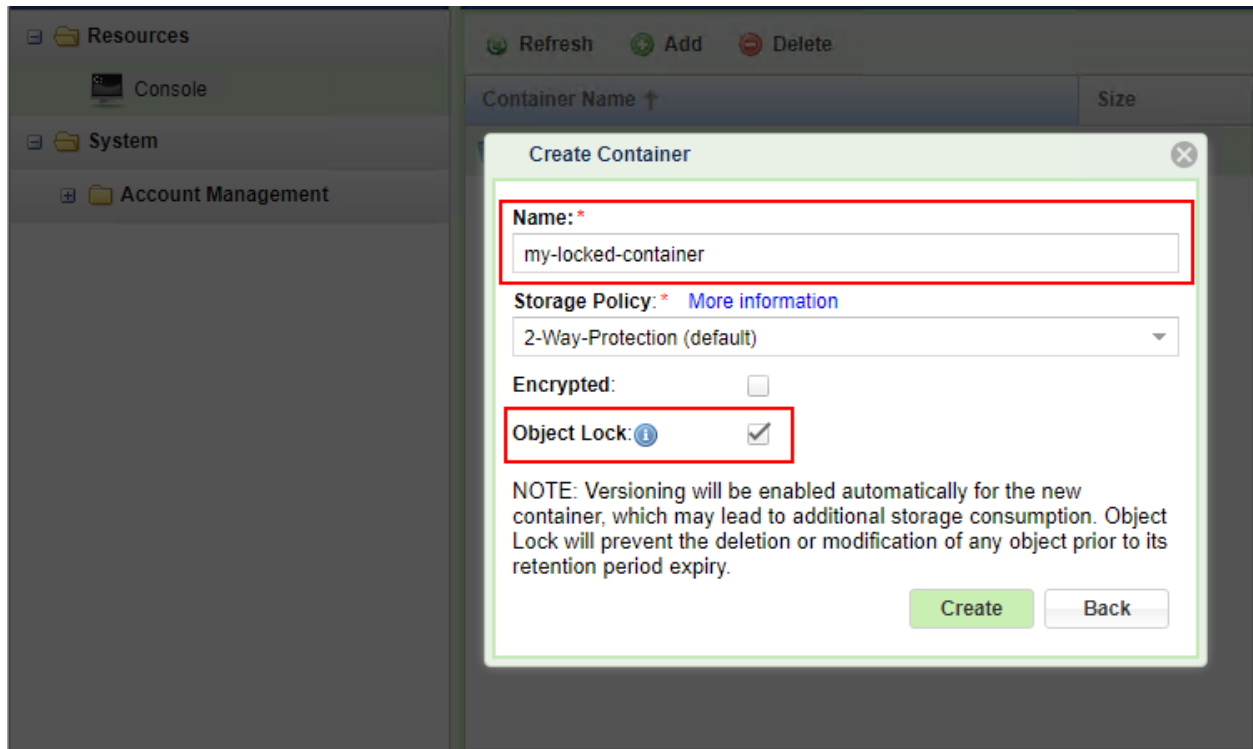
✓ **Note:**

- All object management related operations for a container with S3 Object Lock enabled will be blocked from the VPSA Object Storage management interface.
 - Starting from version 20.01-367, it is possible to set quotas and adjust containers permissions from the VPSA Object Storage management interface.
-

17.2.1 Enable Object Lock from the Management Interface

Object Lock can be enabled for a new container during its creation. In order to create a new container with Object Lock:

1. Login to the management interface.
2. Navigate to the Object Storage Console section.
3. In the upper options menu, click on the Add button.
4. Provide a new container name.
5. Check the "Object Lock" option.
6. Create the new container by clicking the Create button.



Upon creation the Versioning feature will be enabled automatically for the new container.

✓ **Note:** Versioning will be enabled automatically for the new container, which may lead to additional storage consumption. Object Lock will prevent the deletion or modification of any object prior to its retention period expiry.

A container with Object Lock enabled can be identified from the container properties. Object Lock property would be set to true.

Property	Value
Storage Policy	2-Way-Protection
Object Lock	true
Versioning	True
Object Count	0
Encrypted	false
Bytes Used	0

17.2.2 Enable Object Lock using the AWS S3 CLI

In the following examples, we will enable Object Lock using AWS Tools for Power-Shell.

Currently, Object Lock can be enabled and reviewed only from the VPSA Object Storage S3 API interface.

✓ **Note:** The below examples are utilizing Power-Shell syntax. A matching API calls will achieve the same functionality using the language of your choice.

17.2.3 Enabling Object Lock

Object lock should be enabled on the container level, during creation time, Object versioning will be enabled automatically.

Make sure the Object Storage credentials were set.

Define the VPSA Object Storage as an endpoint:

```
$ENDPOINT="https://vsa-0000000b-zadara-qa13.zadara.com"
```

Container Creation

```
$BUCKET="immutable-container"
aws s3api --endpoint-url=$ENDPOINT create-bucket --bucket $BUCKET --object-lock-enabled-for-bucket
```

The expect result should be:

```
{
  "Location": "/immutable-container"
}
```

Confirm Object Lock was enabled for the newly created container

```
aws s3api --endpoint-url=$ENDPOINT get-object-lock-configuration --bucket $BUCKET
```

The expected result should be:

```
{
  "ObjectLockConfiguration": {
    "ObjectLockEnabled": "Enabled"
  }
}
```

Upload an new object

```
$OBJECT="new-object-with-lock.log"
aws s3api --endpoint-url=$ENDPOINT put-object --bucket $BUCKET --key $OBJECT --body $OBJECT
```

#Response

```
{
  "ETag": "\"c6125a47483a2823d993da3d31ba6a50\"",
  "VersionId": "MzMxNjlmNzItOWQ3Ni00MWI0LTl1OGYtZDQyN2RkMjRlN2Jk"
}
```

Set Object retention

```
aws s3api --endpoint-url=$ENDPOINT put-object-retention --bucket $BUCKET --key $OBJECT --retention-Mode=COMPLIANCE,RetainUntilDate=2020-04-01
```

Retrieve object lock configuration:

```
aws s3api --endpoint-url=$ENDPOINT get-object-retention --bucket $BUCKET --key $OBJECT
{
  "Retention": {
    "Mode": "COMPLIANCE",
    "RetainUntilDate": "2020-04-01T00:00:00"
  }
}
```

In this example, the object will remain locked until April 1st, 2020.

List the object versions and attempt to delete a specific version

```
aws s3api --endpoint-url=$ENDPOINT list-object-versions --bucket $BUCKET --prefix $OBJECT
{
  "Versions": [
    {
      "ETag": "%22c6125a47483a2823d993da3d31ba6a50%22",
      "Size": 14871255,
      "StorageClass": "STANDARD",
      "Key": "new-object-with-lock.log",
      "VersionId": "MzMxNjlmNzItOWQ3Ni00MWI0LTllOGYtZDQyN2RkMjRlN2Jk",
      "IsLatest": true,
      "LastModified": "2020-03-08T16:54:30.225Z",
      "Owner": {
        "DisplayName": "veeam:client",
        "ID": "veeam:client"
      }
    }
  ]
}
```

Select the object version and attempt to delete the object

```
aws s3api --endpoint-url=$ENDPOINT delete-object --bucket=$BUCKET --key=$OBJECT --version-id=$VERSION
```

An error occurred (AccessDenied) when calling the DeleteObject operation: Access Denied.