

Leostream Integration for Virtuozzo Hybrid Infrastructure

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CHAPTER 1 What is Leostream?

Leostream is a VDI/DaaS management solution which enables cloud service providers and managed service providers to create, secure and manage multi-tenant Virtual Desktop Infrastructure (VDI)environments and offer Desktop as a Service, running on top of Virtuozzo Hybrid Infrastructure Platform.

In this integration Virtuozzo Hybrid Infrastructure will act as an Infrastructure service provider (IaaS) for Leostream, which will:

- Integrate with Identity Providers such as Active Directory and LDAP to authenticate users accessing the VDI environment and provide domain authentication to your Virtual Desktops.
- Support Multi Factor Authentication (MFA) providers such as Duo, Ping ID and Okta.
- Leverage your corporate Identity Provider (IdP) for authentication into your Leostream environment, using Leostream's support for the SAML protocol.
- Create pools of virtual desktops based on a golden image.
- Automatically scale up and scale down your virtual desktop pools.
- Automatically join provisioned virtual desktops to your Active Directory domain.
- Manage multiple virtual desktop infrastructure tenants.
- Manage the lifecycle of virtual desktops in your pools, including power state and termination.
- Manage multiple clouds or infrastructure as a service (IaaS) providers from a single console.
- Granularly define virtual desktop access control rules and assignment by leveraging, Leostream policies, plans, and assignments.
- Clientless access and multiple display protocol support for HTML5-based RDP, VNC, and SSH viewer.

- Monitor Leostream environments using SMTP and get updates via e-mail.
- Manage user access based on location, for example internal vs external network.
- Generate reports for resource usage, login history, assignment, and Leostream Connection Broker metrics.

1.1 Leostream Platform Components

The Leostream Connection Broker: The backbone of the Leostream platform. From the Leostream Connection Broker you can manage and configure your virtual desktop infrastructure. The Leostream Connection Broker is also responsible for authenticating the user, offering resources (Desktops), assigning virtual desktops, and managing their lifecycle when they are returned to the pool by applying release and power policies.

The Leostream Gateway: A secure gateway that provides access to Virtual Desktops behind a secured zone. Clients, can access remote desktops via the gateway using the HTML5-based web interface which has support for SSH, RDP or VNC protocols and allows you to access remote desktops via the web interface and without the Leostream Connect App. If using the Leostream Connect App clients can connect to the remote desktops using the following protocols RDP, VNC, NoMachine or Mechdyne GTX amongst others.

The Leostream Agent: This component is installed on the Virtual Desktops and provides information to the Leostream Connection Broker about, connected users, actions such as login, reboot etc. This information is used by the Leostream Connection Broker to understand the status of a remote Virtual Desktop, also enables features such as USB device passthrough and network printer redirection. The agent is available for Linux, Windows, and MacOS Operating Systems. For more details see Leostream Agent Administrator's Guide.

The Leostream Connect App: The connect software is a client provided by Leostream that allows users to connect to Remote Desktops. For more details, see the Leostream Connect Administrator's Guide.

Database: The Leostream Connection Broker stores all the information on a Database and for large scale deployments an external Database is recommended. PostgreSQL, Azure SQL, or Microsoft SQL Server are supported.

Architectural Overview

The following figure shows a high-level architecture overview for a typical Leostream deployment on Virtuozzo Hybrid Infrastructure.



Integrating Leostream with Virtuozzo Hybrid Infrastructure

2.1 Example Overview

In this integration guide, our goal will be to explain how to integrate Leostream with Virtuozzo Hybrid Infrastructure. We will be using a Windows 2019 image as a master image/blueprint to create desktops on the VDI pool. We will configure a basic pool; we'll define the concept of pools later. This pool will be in charge of automatically provisioning virtual desktops in order to meet the demand (users logging in to the Gateway). We will also define the minimum/maximum number of virtual desktops our pool will be able to deliver. Leostream, will also be configured to use Active Directory as an authentication method to grant access to our desktop pool resources, every time an Active Directory user logs in to the gateway, it will be forwarded to the Leostream Connection Broker, if the user is a valid AD user, they will be offered a floating desktop (roaming profiles will be used) from the available desktops in the pool. Every time the user logs out from the virtual desktop, the desktop will be freed and offered to another user on login, if there are not enough resources our Leostream Connection Broker will provision them until it hits the provisioning limit.

2.2 Integration Overview

This integration guide aims to explain the steps to integrate Leostream and Virtuozzo Hybrid Infrastructure.

Here is an overview of the steps we will follow:

1. Check Prerequisites.

- 2. Create the Domain, Users and Project on Virtuozzo Hybrid Infrastructure.
- 3. Create the necessary networks for the Leostream Infrastructure. (labeled VDI-network, AD-Network, Gateway-Network and Broker-Network).
- 4. Create a Router (we will enable SNAT on the above networks).
- 5. Create two CentOS 7 VMs, one for the Leostream Connection Broker the other for the Leostream Gateway.
- 6. Create a Floating IP. We will assign a floating IP to the Gateway VM.
- 7. Import Master Windows images.
- 8. Install the Leostream Gateway and assign a floating IP.
- 9. Install the Leostream Connection Broker.
- 10. Configure the Leostream Gateway for Connection Broker forwarding.
- 11. Configure the Leostream Broker, including integration with Virtuozzo Hybrid Infrastructure, building pools that manage capacity in Virtuozzo Hybrid Infrastructure, defining Active Directory authentication servers, configuring plans and policies for user assignment to pools.
- 12. Use the Leostream Connect Client to access the remote desktops.

2.3 Prerequisites

• The Leostream Connection Broker needs to access the OpenStack API endpoint in order to manage the infrastructure.

[centos@leostream-broker ~]\$ curl -k https://192.168.0.225:5000/v3 ; echo {"version": {"status": "stable", "updated": "2019-01-22T00:00:002", "media-types": [{"base": "application/json", "type": "applicati on/vnd.openstack.identity-v3+json"}], "id": "v3.12", "links": [{"href": "https://192.168.0.225:5000/v3/", "rel": "self"}]}} [centos@leostream-broker ~]\$ ■

- A user with admin rights for Virtuozzo Hybrid Infrastructure, which will be used to create a Domain, Users and Project described in the next section. The project in Virtuozzo Hybrid Infrastructure must include enough resources for the Leostream components and the VDI infrastructure.
- You will also need an image for CentOS 7 available on your Virtuozzo Hybrid Infrastructure project.
- A VM with Active Directory Configured, we will be using Active Directory as the authentication method

to access Virtual Desktops.

- A golden Virtual Desktop image (a Windows Desktop image with the Leostream Agent installed ensure this image is created after installing the Leostream Connection Broker, as we will need the IP of the Leostream Connection Broker for the agent). This image will be used as a base for the creation of the Pools.
- A Leostream Serial Number to generate the License.

Creating Virtuozzo Hybrid Infrastructure Resources

Create the necessary resources on your Virtuozzo Hybrid Infrastructure (Domain, Project, and User) to host the Leostream VDI workloads and access them securely.

	Virtuozzo	_
	Sign in	
Login admin		
Password	~	
	Sign in	

1. Login to the Virtuozzo Hybrid Infrastructure admin panel.

2. Go to **Settings > Projects and users** in Virtuozzo Hybrid Infrastructure and click on **Create domain**.

	_	0			labs.example.com	¢		⊕ + 88
Virtuozzo	Projects and users							4 Q
🛃 MONITORING 😳	Search Q							+ Create domain
	Domain name 🕇	Description	Projects 4	Branding +		Domain URL		0
STORAGE SERVICES	Default System	The default dom	1	DEFAULT		https://192.168.0.225:8800/login/De	ault	
ξ <u>Ο</u> ξ settings								
Add-on services								
Projects and users								
System settings								
Updates								
Management node								
Security								
vmstorage 🤗								

3. In the **Create domain** form, shown in the following figure, enter a **Name** and **Description** for the Domain you will use to host our users and projects (tenants), and click **Create**.

•••	0	ii labs.example.com	۵	
Virtuozzo				۵ ۵
		Create domain	×	+ Create domain
		Projects i Name ringo-cloud	omain URL	0
STORAGE SERVICES		Description (optional) Cloud Domain for Ringo Cloud Ltd Multiple Tenants	rtps://192.168.0.225.8800/login/Default	
		Cancel	Create	
C SETTINGS				
Add-on services				
Licenses				
Projects and users				
System settings				
Updates Management node				
Security				

4. Select your new domain on the Settings > Project and users page and go to the Domain users tab. Click Create user to create a Domain administrator. Specify the Login, Password, and optionally email address and description. As we are creating a Domain administrator, please ensure that you select Domain administrator from the Role drop-down menu.

••• • • • •	0	i abs.example.com	c	
Virtuozzo	Projects and users > ringo-cloud			0 ©
		Create user	×	
COMPUTE		Login Email (optional) paul		
BB STORAGE SERVICES		Password		
		Description (optional) Domain Administrator - Will be able to see all Projects and Users and manage them.		
₹Ĝ} settings				
Add-on services		Role Domain administrator		
Licenses		Can create and manage services in the assigned domain.		
Projects and users		Image uploading		
System settings		Carrel C	rasta	
Updates		Cancer	reale	
Management node				
Security				
vmstorage 💿				

5. Select your new domain on the Settings > Project and users page and go to the Projects tab. Click Create project to create a new project to host the Leostream Platform and Virtual Desktop Infrastructure resources. Enter a Name and optionally a Description for the project, and set any compute quotes, as shown in the following figure.

••• • • < >	0	≅ labs	.example.com		¢	٢
Virtuozzo	Projects and users) ringo-cloud					
	DOMAIN USERS PROJECTS SETTINGS	Create project		×		
		Name hospital-vdi	Enabled			
STORAGE SERVICES		Description (optional) Strawberry Fields Hospital VDI Cloud Infra:	structure will be created h	ere (PAYGO)		
 settings 		Specify compute quotas				
Add-on services		vCPUs	Unlimited	0		
Licenses		C RAM, GIB	Unlimited	0		
Projects and users		Storage policy		_		
System settings		erasure-coding-2-nodes-can-die	e, 🗹 Unlimited	0		
		default, GIB	Unlimited	0		
		(1) Floating IPs	Unlimited	0		
Security		د Load balancers	Unlimited	0		
		- Kubernetes clusters	Max. 20	0		
			Γ	Cancel Create		

Select your new domain on the Settings > Project and users page and go to the Domain users tab.
 Click Create user to create a Project member from the Role drop-down menu, as shown in the following figure.

●●● □	0	ii labs.example.com	¢	<u></u> ± ů + ≋
Virtuozzo				4 O
		Create user	×	
COMPUTE		Login ringo Email (optional) ringo@ringo.lo		+ Create user
B STORAGE SERVICES		S Password	Role	Projects Ö
		Description (optional) Ringo will manage the VDI infrastructure for Strawberry Fields Hospital	or - Will be a Domain administrator	All
(값) SETTINGS		Role Project member		
Licenses.		Can create and manage services in assigned projects.		
Projects and users		Image uploading		
System settings		Assign to projects + Assign		
Management node		🗟 hospital-vdi 🛛 🗙		
Security		Cancel Conce		
		Cancer		
vmstorage O				

- To assign the project user to your project, select your new domain on the Settings > Project and users page and go to the Projects tab. Click the ellipses at the far right of the project's row then click Assign members.
- Go to the **Compute > Networks** page to enable your project to access the external network and a pool of Floating IP addresses.
 - select your external network
 - from the panel right, click **Edit** in the **Network** access section
 - ensure your new project is selected in the **Edit network access** form, as shown in the following figure

•••	0		≗ la	bs.example.com		Ċ	🛓 🖞 + 88
Virtuozzo							×
		Ed	t network access		×		
сомрите		Sele	ct projects to provide network access t	0.			
Overview		adidress m	ielect projects O All projects				
Nodes		abled	rron		q		1
Virtual machines		abled	Name ↓	Access options			
Network		abled	C Default (2/2)	Full			
Storage			A UNIVERSITIED	Rocked	_		65448757472b0
Kubernetes				Cancel	Save		
STORAGE SERVICES							Add 🐱
C SETTINGS							
							/ Edit
							,
							,
vmstorage 🥥							

Creating Networks for Leostream

After creating the domain, project, and users for your Leostream environment, use the self-service portal to configure the required network. The self-service portal is typically available at:

https://<admin_panel_virtual_IP_address>:8800

1. Log in to the self-service portal, with the credentials for the project user.

0	á labs.example.com	6	.↓ Ů + 88
	Virtuozzo		
	Sign in		
	Domain		
	ringo-cloud		
	Login ringo		
	Password		
	Sign in		

2. Go to the Networks page to create four networks for your deployment:

- VDI-network
- AD-Network
- Gateway-Network
- Broker-Network.

Click the **Create virtual network** button and proceed through the wizard to configure the networks as per your requirements. For more info on how to create networks check here Creating Compute Networks and look for the steps to create a virtual network.

If you are integrating with Active Directory, add your Active Directory IP as your DNS Server for the VDI-network as shown in the following figure.

•••		0.	⊜ labs.er	sample.com	Ċ	<u></u>	Ů + 88
Virtu							A 0
4.			Edit IPv4 subnet	×	< ×		
Ø			CIDR 10,164,10.0/24	Gateway (optional) 10.164,10,1			al network
			Built-in DHCP server 0		Add ~		0
					/ ± >		
			Allocation pools	€ Add			
			DNS servers	⊕ Add			
			8.8.8	l ñ			
				Cancel Save			

3. Go to the Routers page to create a Virtual Router. Ensure that you enable SNAT, as shown in the following figure, in order to allow the VMs access to the internet. For more information, see Creating virtual routers.

••• • • • •	0	ii labs.example.com	¢	📩 🖞 + 📾
Virtuozzo				hospital-vdi 🗸 🔑 🕘
📲 Compute 🗈 Routers	Add virtual	router	×	
Wrtual machines	Name router1			
A Security groups				
Volumes	Specify a network	through which public networks will be accessed.		
A Networks	192.168.0.0/24	k 192.168.0.0/24		
22 Routers	SNAT 🛛			
Ibasing Ps A Load balancers				
₽ SSH keys	Add internal	interfaces + Add		
	VDI-Network	k: 10.164.10.0/24 ~ ē		
	Broker-Netv	voric 10.164.12.0/24 ~ 🛱		
	Gateway-Ne	etwork: 10.164.11.0/24 ~ 🖻	1	
	AD-Network	: 10.164.13.0/24 ~	NAT between private and	
		Cancel	ie	

When completed, your virtual router appears similar to the example shown in the following figure. Security groups can be created in order to restrict and isolate the networks if needed. Later in this document we will enumerate the ports that must be allowed between the Leostream Connection Broker, the Leostream Gateway and the virtual desktops.

				0	≅ labs.example.com	ć	
Virtu	ozzo						hospital-vdi 🗸 🤔 🔘
∿•	Compute	•	Compute > Routers > Route	r			
Ø	O Virtual machines		INTERFACES STATIC ROUTES				
	 Security groups Images 		Search Q				+ Add
	Volumes		IP address \downarrow	Status 👃	Туре	Network	0
	** Routers		192.168.0.11	Active	External gateway	/ 192.168.0.0/24	
	Floating IPs		10.164.13.1	Active	Internal interface	e AD-Network	
	កំ Load balancers		10.164.11.1	📀 Active	Internal interface	e Gateway-Network	
	SSH keys		10.164.12.1	Active	Internal interface	e Broker-Network	
			10.164.10.1	Active	Internal interface	e VDI-Network	

Installing Leostream in Virtuozzo Hybrid Infrastructure

The Leostream Connection Broker must be installed in a location where it has network access to the Leostream Agents installed on your VDI instances. The following procedure covers installing a single instance of the Leostream Connection Broker and Leostream Gateway. For information on creating clusters of Connection Brokers for large-scale production environments, see the Leostream Scalability Guide.

5.1 Security Groups Requirements

Before creating your Connection Broker and Leostream Gateway instances, ensure that you have the appropriate security groups configured in Virtuozzo Hybrid Infrastructure. Leostream requires the following ports be open for incoming traffic to the specified component. Consider three separate security groups:

- Connection Broker
- Leostream Gateway
- VDI instances

Port	Required By	Purpose
22	Connection Broker,	For SSH access to the Connection Broker or Leostream
	Leostream Gateway	Gateway, if required.

Continued on next page

Port	Required By	Purpose
443	Connection Broker,	For access to the Connection Broker Web interface, and
	Leostream Gateway	communications from the Leostream Agents and
		Leostream Connect.
		On the Leostream Gateway, for communication from
		Leostream Connect and to use the Leostream HTML5
		viewer.
20001-	Leostream Gateway	The Leostream Gateway uses this default port range to
22000		forward display protocol traffic from the user's client device
		to an instance isolated in a private VHI network. You may
		optionally change this port range using the Leostream
		Gateway CLI.
		NOTE: You do not need to open this range if you use the
		display protocol port for forwarding desktop connection
		traffic. For that scenario, open the display protocol port in
		the Leostream Gateway security group, instead.
8080	VDI instances	Port for communications from the Connection Broker to
		the Leostream Agent.
		* The Leostream Agent port may be changed using the
		Leostream Agent Control Panel dialog. If you change the
		default Leostream Agent port, ensure that you open the
		associated port in the security group
3389**	VDI instances, Leostream	For RDP access to the VDI/DaaS instances
	Gateway	** This port is dependent on the display protocol you plan
		to use. If you use a display protocol other than RDP, ensure
		that you open the ports required by that display protocol.

Table	5.1.1	 continued	from	previous	page
1 4010	0	0011111000		p1011000	page

5.2 Creating Leostream Infrastructure VMs (Broker and Gateway)

The Connection Broker and Leostream Gateway install on the latest 64-bit CentOS 7 or Red Hat Enterprise Linux 7. Each component requires a unique VM. **Note:** Neither the Connection Broker nor the Leostream Gateway can be deployed on CentOS 8, Red Hat Enterprise Linux version 8, or any other Linux distribution.

When creating a virtual machine for the Connection Broker installation, ensure that the VM has, at least, the following resources:

- 4 vCPUs
- 8.0 GB of RAM
- At least 20 GB of hard drive space
- One NIC, ideally with internet connectivity

At a minimum, create a virtual machine for your Leostream Gateway with the following resources.

- 2 or more CPUs or vCPUs at 2.5GHz or higher
- 4 GB of RAM, more if using the built-in Leostream HTML5 viewer.
- 4 GB of swap space
- 20 GB of free disk

To create virtual machines using the VM creation wizard. Go to **Compute > Virtual Machines** and click **Create Virtual Machine**. For complete instructions, see Creating virtual machines. The following figure shows an example creating a VM for the Connection Broker from your CentOS 7 image and using a large flavor.

•••	$\square \mid {\scriptstyle \sim} < >$		0	i labs.example.com	e	🛓 🛈 + 88
Virtu			_			
~~			Create virtual machine		×	
			Review the virtual machine details and go bac	k to change them if necessary.		
Ψ						
			Name Broker	Deploy from: O Image O Volume		
			Image	CentOS-7-x86_64	0	
			Volumes	Boot volume — 8 GiB, default 📧	1	
			Flavor	large — 4 vCPUs, 8 GiB RAM	1	
			Network interfaces	Broker-Network — Auto	1	
				Primary IP: Auto Security groups: 1		
			SSH key (optional)	Jesus-bustos	0	
			Customization script (optional)	Specify	1	
					Cancel Deploy	
				No virtual machines t	to show	
_						

When creating the VMs ensure that the Connection Broker VM has access to the Broker-Network and the Gateway VM has access to the Gateway-Network by attaching the network during the VM creation wizard. If you forget to do so, you can attach the network once the VM has been created.

Adding Floating IP to Gateway VM (DNAT Access)

The Leostream Gateway provides access to the private virtual desktops and forwards traffic to the Connection Broker, which is behind a firewall. To make the Leostream Gateway publicly accessible, associate a floating IP address with the Leostream Gateway's private IP, as follows.

- From the self-service portal, go to Compute > Floating IPs and click Add to allocate a new floating IP to your project.
- Click the ellipses icon at the far right of the row for your new floating IP, and select Assign. In the Assign floating IP address window, select the Leostream Gateway VM network interface with a fixed private IP address.

Virtuozzo hospital-vdi ~											
≁∘	Compute	e	Floa	loating IPs							
0	Virtual machines		Searc	ch Q				[+ Add		
	 Security groups Images 			IP address 🕇	Status	Network	Assigned to	VM IP address	¢		
	G Volumes			192.168.0.12	Active	192.168.0.0/24	Leostream-Gateway	10.164.11.191			
	& Networks			(P) 192.168.0.23	S Inactive	192.168.0.0/24	-	-			
	Routers										
	Floating IPs										
	Å Load balancers										
	SSH keys										

The following figure shows a floating IP assigned to a VM IP address.

Installing and Configuring Leostream Gateway

After building and updating your base operating system, run the following command to install your Leostream Gateway.



The installation script downloads and installs any dependencies required by the gateway.

Installing Leostream Connection Broker

Prior to installing your Connection Broker or Leostream Gateway, install the latest updates on both operating systems. After the updates are applied, if your Connection Broker instance has access to the internet, you can install the Connection Broker by logging into the instance's console and executing the following command:



If your Connection Broker instance does not have internet access, download the Connection Broker package from the following location and copy the file into the Connection Broker instance.

https://www.leostream.com/resource/leostream-connection-broker-9-0/

After the installation is complete, ensure that your Connection Broker can access the OpenStack API endpoint in order to manage Virtuozzo Hybrid Infrastructure. You can do this by running the following command, and shown by example in the following figure.

curl -k https://external_openstack_ip:5000/v3.0 ; echo

centos@leostream-broker ~]\$ curl -k https://192.168.0.225:5000/v3 ; echo
{"version": {"status": "stable", "updated": "2019-01-22T00:00:00Z", "media-types": [{"base": "application/json", "type": "applicati
on/vnd.openstack.identity-v3+json"}], "id": "v3.12", "links": [{"href": "https://192.168.0.225:5000/v3/", "rel": "self"}]}}
[centos@leostream-broker ~]\$

The Connection Broker uses the private IP address assigned by Virtuozzo Hybrid Infrastructure on the network you selected when creating the VM. To access the Connection Broker Administrator Web interface, you must be able to access the Connection Broker from a Web browser, which you can do by enabling Connection Broker forwarding on the Leostream Gateway, as described in the following section.

Configuring Leostream Connection Broker

9.1 Enabling Connection Broker Forwarding

The Leostream Gateway can be used to forward user login traffic from Leostream client devices to the Leostream Connection Broker. With Connection Broker forwarding enabled, the Connection Broker does not need to be accessible from the user's client device and, instead, can be isolated in the same network as your desktops.

To enable Connection Broker forwarding, log into your Leostream Gateway and execute the following command:

sudo leostream-gateway --broker <your-broker-address>

The following figure shows an example of enabling Connection Broker forwarding:



You can now access the Connection Broker Administrator Web interface using the public floating IP address of your Leostream Gateway.

9.2 Licensing Leostream Connection Broker

Your Connection Broker license is derived from the serial number you received from Leostream Sales. If you do not have a Leostream 9 serial number, please contact sales@leostream.com. To obtain your license key:

- 1. Point a web browser at the IP address of the machine running the Connection Broker. The Connection Broker **Sign In** page opens.
- 2. Log into your Connection Broker using the following default administrator credentials:

username=admin password=leo

- 3. On the **Leostream License** page, select **Enter manually** from the **How do you want to enter your license key** drop-down menu.
- 4. Below the drop-down, click the link to go to https://license.leostream.com. The installation code for your Connection Broker is automatically populated.
- 5. Enter the serial number you obtained from Leostream sales.
- 6. Enter the email address associated with that serial number.
- 7. Click Generate a license.
- Click the Apply to the broker button above the generated license key. The browser returns to the Leostream License page.
- 9. Select the I have read and accept the License Agreement check box.
- 10. Click Save.

Important: The generated license key is linked to this Connection Broker installation or cluster. If you rebuild your Connection Broker or create a second Leostream environment, contact sales@leostream.com to obtain a new serial number for that environment.

After you license your Connection Broker, you arrive at the **Dashboard > Pool Statistics** page, shown in the following figure.

$\square - < >$	•••	a labs.broker.example.com ⊘	() (¹) + 88
Signed in as Administrator \sim	Pool Statistics		
Dashboards ~	lisers Longed in	Users Connected	l iconsos In Uso
Setup 🗸			
Configuration ~			5725 USERS
Resources ~	Desktop assignment status		
System ~	All Desktops		
This product is Scenard to "Virtuazo Affances Team" This Scenare argines 2022-12-31 Your support Scenare argines 2022-12-31 Connection Broker ventions 5.1.12.0 Using Internat distalease Page updated 2022-03-02-3.0.51.10 Scenarios (Scinard Respon) Prochage	Available Assigned		

There are six main management pages accessible from the menu along the left side:

- **Signed in** indicates who is logged in and contains tools for logging out and resetting the Administrator Password.
- **Dashboard** provides information about pool statistics, reports, and Leostream component downloads.
- **Setup** integrates with external systems, such as Authentication Servers, MFA providers, Virtuozzo Hybrid Infrastructure, and Leostream Gateways.
- **Configuration** defines VDI workflows, including pools, protocol plans, power control plans, release plans policies, locations, and assignments.
- **Resources** lists all managed resources, including virtual machines imported from or generated on Virtuozzo Hybrid Infrastructure.
- System configures system parameters, such as SNMP, Alerts, Backups, add SSL certificates.

9.3 Changing Default Admin Password

For security reasons, change the default administrator password the first time you use your Connection Broker. To change the administrator password, log in to the Connection Broker as the default administrator and go to the **Sign in > My Options** page, shown in the following figure.

••• • • < >	,	••• [•] ©	≘ la
LEOSTREAM	Э		
Signed in as Administrator	~	My Options	0
Sign Out		Display Options	
My Options		Display options	
Dashboards	~	Highlight active table filters	
letup	~	Remove Table Customizations	
Configuration	~		
Resources	~	Demographic Information	
System	~	Email address	
		Password	
his product is licensed to "Virtuozzo Illances Team"			
		Re-type password	
/our support license expires: 2022-12- Jonnection Broker version: 9.1.12.0	31		
Page updated: 2022-03-02 - 21:06:50		Save	

- 1. Enter a new password in the **Password** edit field.
- 2. Reenter the new password in the **Re-type password** edit field.
- 3. Click Save.

Important: The Connection Broker cannot remind you of your password. If you forget your administrator password, reset it using the Connection Broker virtual machine console. See "Resetting the Default admin Password" in the Connection Broker Security Review document for complete instructions.

Preparing Master Images

Leostream can manage connections to existing virtual machines and provision new virtual machines from existing Virtuozzo Hybrid Infrastructure images.

Important: Currently, you cannot create new images within the Leostream interface. All images must be created using native Virtuozzo Hybrid Infrastructure tools.

10.1 Supported Operating Systems

The Leostream Connection Broker can manage connections to virtual machines running any of the following operating systems:

- 1. Any Microsoft Windows operating system version currently covered by Mainstream Support under the Microsoft Fixed Lifecycle Policy, or in service under the Microsoft Modern Lifecycle Policy.
- 2. Any of the following operating systems when running a Java Runtime Environment version 1.7, or later:
 - CentOS
 - Debian
 - Fedora
 - SUSE Linux Enterprise
 - Red Hat Enterprise Linux
 - Ubuntu

macOS

When creating instances within Virtuozzo Hybrid Infrastructure, ensure that you install the appropriate Leostream Agent onto the virtual machine and register that agent with your Leostream Connection Broker, as described in the following section.

To upload an existing image, consult the Virtuozzo documentation.

10.2 Installing Leostream Agent

When installed on a desktop, the Leostream Agent provides the Connection Broker with additional information about the user's session, including:

- When the user logs into the remote desktop
- When the user disconnects from the remote session
- When the user logs off of the remote desktop
- When the user locks or unlocks their remote desktop
- When the user's session is idle

In addition, the Connection Broker requires the Leostream Agent to enforce certain role and policy options, including:

- Adding Local Users or adding users to the Remote Desktop Users group
- Taking actions when the user disconnects from their remote session
- Using release plan options to lock, disconnect, or log out the user after their session is idle
- Attaching network printers specified by Connection Broker printer plans
- Using registry plans to modify or create registry keys on the remote desktop
- Changing the hostname and joining newly provisioned Windows virtual machines to an Active Directory domain

Leostream provides a Leostream Agent version for Windows operating systems and a Java version of the Leostream Agent for Linux operating systems. Ensure that you download the appropriate Leostream Agent from the Leostream Downloads page. Consult the Leostream Installation Guide for instructions on how to install the Leostream Agent on your Virtuozzo Hybrid Infrastructure virtual machines. The Connection Broker address can be specified when you install the Leostream Agent. If you need to specify or change the Connection Broker address after the Leostream Agent is installed, you can use the Leostream Control Panel dialog in Windows or set the address in the leostreamagent.conf file on Linux. See the Leostream Agent Administrator's Guide for more information.

10.3 Requirements for Performing Domain Joins

If you plan to use Leostream to provision new Windows instances in Virtuozzo Hybrid Infrastructure and to have Leostream update and hostname and join these new Windows instances to your Microsoft Active Directory domain, please adhere to the following guidelines when building the master image to use for provisioning.

- The instance used to create the image must not be joined to the domain. Leostream only joins instances to a domain if they are currently part of a Workgroup.
- The instance must have an installed Leostream Agent that is registered with your Connection Broker. If the Leostream Agent cannot communicate with the Connection Broker, new instances will not be joined to the domain.

Integrating External Systems

11.1 Connecting to Authentication Servers

The Connection Broker can authenticate users against Microsoft Active Directory and OpenLDAP authentication servers. To authenticate users, you first register your domain with your Connection Broker.

- 1. Go to the **Setup > Authentication Servers** menu.
- 2. Click the Add Authentication Server link.
- 3. In the Add Authentication Server form, select Active Directory from the Type drop-down list.
- 4. Enter the name for this server in the Connection Broker in the **Authentication Server name** edit field, as shown in the below image.
- 5. In the **Domain** edit field, enter the domain name associated with this Active Directory server.

••• • • • • •	📲 🕕 🔒 labs.1	roker.example.com	⊕ Å + 88
LEOSTREAM			
Signed in as Administrator	Edit Authentication Server 📀	To edit the Assignments made by this authentication server, click here. The following items depend on this authentication Senar	
Setup Y	Tipe Active Directory	The bulkness in the to depend on this is rub memoration over we Pools: Theoring Pool	
	Authentication Server name active directory III Duration IIII		
	Domain		
	Known dataset of any damage damage Yes Sectory datasets of the sector datasets Yes Sectory datasets Yes, as advator' database the advator or all other authentication survers		

6. In the **Connection Settings** section, shown in the following figure, use the following procedure to integrate with your Active Directory authentication server.

rags			
Configuration	~	Connection Settings Specify address using	
Resources	~	Hostnames or IP addresses	~
System	×	Hostname or IP address Port 10.164.14.175 389	
This product is licensed to "Vi Atlances Team"	Muazzo	If using multiple addresses, separate each entry with spaces Algorithm for selecting from multiple addresses Bandom	
This license expires: 2022-12- Your support license expires: 5 Connection Broker version: 0.	-91 2022-12-91 1.12.0	The sequential algorithm uses the first working address in the list Encrypt connection to the authentication server using SSL (LDAPS)	
Using internal database			

- 6.1. From the Specify address using drop-down menu, select Hostname or IP address.
- 6.2. Enter the authentication server hostname or IP address in the Hostname or IP address edit field.
- 6.3. Enter the port number in the Port edit field.
- 6.4. Check the Encrypt connection to authentication server using SSL (LDAPS) checkbox if you need a secure connection to the authentication server.
- 7. In the **Search Settings** section, shown in the following figure, enter the username and password for an account that has read access to the user records. Leostream does not need full administrator rights to your Active Directory authentication server.

Search Settings Enter the credentials for a If you do not enter creden	a user who has the permissions to search for other users. ntials an anonymous bind will be used.
Login name or DN	
admin01@vdi.vz	
Inter a fully qualified login name, e.	g. Administrator@YOUR_DOMAIN.com or CN-Administrator;CN-Users,DC-YOUR_DOMAIN,DC-com
Password	

- 8. In the **User Login Search** section, ensure that the **Match Login name against this field** edit field is set to **sAMAccountName**. This is the attribute that the Connection Broker uses to locate the user in the authentication server, based on the information the user enters when logging into Leostream.
- 9. Click Save.

11.2 Integration with Virtuozzo Hybrid Infrastructure

To integrate with Virtuozzo Hybrid Infrastructure, you create an OpenStack *center* in Leostream for each project you want to manage in your Connection Broker.

Important: Leostream defines **centers** as the external systems that inform the Connection Broker about desktops and other resources that are available for assignment to end users.

Leostream uses the OpenStack APIs to inventory the instances and images in your Virtuozzo Hybrid Infrastructure project.

To integrate with Virtuozzo Hybrid Infrastructure:

- 1. Go to the **Setup > Centers** page.
- 2. Click the **Add Center** link.
- 3. In the **Add Center** form, select **OpenStack** from the **Type** drop-down menu (the Leostream license controls if OpenStack is available as a center).
- 4. Enter the name for the center in the **Name** edit field.
- 5. In the Auth URL: VHI OS_AUTH_URL e.g. https://virtuozzo.admin.panel.ip:5000/v3.
- 6. Enter the default Virtuozzo Hybrid Infrastructure region (VHI region = RegionOne) in the **Region** edit field.
- 7. Enter the domain you created for your project in the Project Domain edit field.
- 8. Enter the name of the project you created in the Project edit field.
- 9. Enter the domain, username, and password of the user you created in the previous steps into the User Domain, Username and Password edit fields, respectively.
- 10. Click Save to create the center. The following figure shows an example of a saved OpenStack center for Virtuozzo Hybrid Infrastructure.

Add Center								Customize columns	Export list
Actions	Name 🔺	Type All ~	Datacenter	Status All ~	Desktops	Version All ~	Server		
Edit Scan View Log	labs.example.com	OpenStack	hospital-vdi	Online	4	OpenStack	https://192.168.0.225:5000/v3		
Edit Scan Log	PCoIP Devices	PCoIP Devices		Online					
2 rows									

The instances in the Virtuozzo Hybrid Infrastructure project appear in the **Resources > Desktops** page. The Connection Broker inventories all images and displays them on the **Resources > Images** page, for example.

••• • • • • •				≘ la	bs.broker.example.com		Ċ)	() (5 + 88
leostream⊙										
Signed in as Administrator \sim									Customize columns	Export list
Dashboards ~	Name	Center	Operating System	Visibility	Image Type	Size (GB)	Creation Date	Description		
Setup 🗸	All ~	All 🗸	Al V		Al v					
Configuration ~	BitNinja	labs.example.com	Unspecified	Public	OpenStack	3.33	2022-02-22 - 20:46:40			
Rasnumas v	cirros	labs.example.com	Unspecified	Public	OpenStack	0.01	2022-02-28 - 15:15:13			
	fedora-coreos-x64-k8saas	labs.example.com	Unspecified	Public	OpenStack	2.49	2022-02-18 - 09:24:57			
Desktops	leo-dc-01-share	labs.example.com	Unspecified	Public	OpenStack	0.03	2022-03-01 - 08:17:55			
	win10-vdi	labs.example.com	Unspecified	Public	OpenStack	10.93	2022-03-01 - 19:01:30			
Users	7 rows	labs.example.com	Unspecified	Shared	OpenStack	0.00	2022-03-02 - 12:27:32			
Collaborations										
Clients										
System ~										
This product is licensed to "Virtuozzo Allances Team"										
This license expires: 2022-12-31										
Your support license expires: 2022-12-31										
Connection Broker version: 9.1.12.0										
Using internal database										
Page updated: 2022-03-02 - 21:23:08										
Countead Technical Buggert Package										

11.3 Adding Leostream Gateway

You add your Leostream Gateway to your Connection Broker, as follows.

- 1. Go to **Setup > Gateways** page.
- 2. Click the **Add Gateway** link.
- 3. In the Add Gateway form, enter a name for the Gateway in the Name edit field.
- 4. For this example, enter the publicly accessible IP address or hostname for your Leostream Gateway. If you are placing the Leostream Gateway behind your corporate firewall, enter the public address of your firewall.
- 5. In the IP address or FQDN used for Connection Broker communications to this Gateway field, enter the private address of your Leostream Gateway. This address is optional. If provided, the Connection Broker communicates with the Leostream Gateway using a private address. This address is

never used for forwarding display protocol traffic.

6. If this gateway is used to forward client-based display-protocol traffic, use the Method for routing display protocol traffic through this Leostream Gateway drop-down menu to indicate which method the gateway uses to configure the firewall rule for routing traffic.

Note that the option you select here has ramifications on the ports you must open in the Security Group assigned to your Leostream Gateway virtual machine. The method for routing display protocol influences which ports should be open on your Leostream Gateway.

LEOSTREAM		
Signed in as Administrator \sim	Edit Gateway "Gateway Leostream"	This gateway is used in this protocol plan:
Dashboards ~		Default
Setup ~	Name Gateway_Leostream	Leostream Gateway information: Port range is 20001-23000 Gateway version is 2.0.0.19
Authentication Servers	Add this Leostream Gateway to a Gateway Cluster	The VPN is OFF Connection Broker forwarding is OFF Azure Broker forwarding is OFF
MFA Providers	prome available; Public IP address or FQDN for use in Protocol Plans	Guacamole is ENABLED
Centers	labs.gateway.example.com If this Gateway example.com If this Gateway is located behind a load balancer or external freesil, enter its public IP address or FODN. This address must be accessible from the user's client device.	
Gateways	IP address or FQDN used for Connection Broker communications to this Gateway	
SMTP	Unique IP address or FGDN of this Leosteware Galeway, Not required if same as Public IP address above.	
Tags	Method for routing display protocol traffic through this Leostream gateway	
Configuration ~	Use protocol-specific port on both gateway and desktop, filtered by client source IP address	
Resources ~		
System ~	Notes	
This product is licensed to "Virtuozzo Allances Team" This license expires: 2022-12-31	Save	
Your support loonse expires: 2022-12-31 Connection Broker version: 9.1.12.0 Using internal database		

7. Click **Save**. After saving the form, the Connection Broker registers with the Leostream Gateway and you can now use the gateway in your protocol plans.

Pooling and Provisioning in Virtuozzo Hybrid Infrastructure

After you create your centers and the Connection Broker inventories your desktops, you can logically group the desktops into **pools**.

The Leostream Connection Broker defines a pool as any group of desktops. Pools can be nested within one another, to create sub-pools. Pools and sub-pools have three distinct functions in Leostream.

- 1. Organizing desktops on the **Resources > Desktops** page.
- 2. Provisioning new instances in your Virtuozzo Hybrid Infrastructure project.
- 3. Indicating the desktops that a user may connect to and how the Connection Broker manages the user's connection to those desktops.

12.1 Creating Pools

When using Leostream to provision new instances in Virtuozzo Hybrid Infrastructure, the key is to construct your pool in a way that ensures that newly provisioned desktops become members of that pool. One method is to set the pool to contain all instances in the Virtuozzo Hybrid Infrastructure project associated with the center you created in the previous chapter.

If that pool definition is too broad, another easy way to ensure that new desktops become part of a pool is to define the pool based on the instance name, which you set during provisioning, for example:

- 1. Go to the **Configuration > Pools** page.
- 2. Click the Create Pool link. The Create Pool form opens.

- 3. Enter a name for the pool in the **Name** edit field.
- 4. In the first row of the **Desktop Attribute Selection** section:
 - 4.1. Select **Name** from the **Desktop attribute** drop-down menu.
 - 4.2. Select **begins with** from the **Conditional** drop-down menu.
 - 4.3. In the **Text value** field, enter the name you will use for all the instances in this pool. For example, the following form looks for virtual machines with a name that contains the text desktop.

		0
Name		
Floating Pool		±
Display name		
Floating Pool		
Pool Definition		
Subset of pool		
Air Desktops		¥_]
Define pool using		
Desktop attributes		~
Desktop attribute	Conditional Value	
Name	contains desktop	
	~	
	\ \	

5. Click **Save** to save the pool.

For a complete description of creating pools, see the "Creating Desktop Pools" chapter in the Connection Broker Administrator's Guide.

12.2 Provisioning New Instances

Provisioning allows you to generate new Virtuozzo Hybrid Infrastructure instances when the number of desktops in a pool reaches a specified lower threshold.

Note: Your Connection Broker license determines if provisioning is enabled in your Connection Broker.

The **Provisioning** section of the **Edit Pool** page allows you to configure when and how the Connection Broker creates new instances in your Virtuozzo Hybrid Infrastructure project. To begin, check the **Provisioning enabled** checkbox, as shown in the following figure.

	Ŭ
Provisioning	
Provisioning ena	bled
Provisioning Limits	3
Start provisioning w	nen unassigned desktops in pool drops below
1	
Stop provisioning w	nen total desktons in nool reaches
Cop provisioning wi	
2	

The Connection Broker determines when to create new instances by comparing the thresholds specified in the **Provisioning Limits** section to the current contents of the pool. If you edit an existing pool, the Connection Broker displays the current contents of the pool size to the right of the **Edit Pool** form, for example:

Pool size information (updated less than a minute ago) * Total: 46 Available: 44 Unavailable: 1 Assigned: 1 Running: 17 Stopped: 29 Suspended: 0 Agent running: 7

The number entered into the **Start provisioning when unassigned desktops in pool drops below** field specifies a lower bound on the number of unassigned desktops in the pool, where the number of unassigned desktops is the total number of desktops minus the number of assigned desktops.

For example, the previous figure shows one assigned desktop and 46 total desktops. Therefore, there are 45 unassigned desktops. An unassigned desktop can have a desktop status of either available or unavailable.

The Connection Broker checks the provisioning limits, and creates new instances, at the following times:

- When the pool is saved
- When a user is assigned to a desktop in this pool
- When any pool_stats or pool_history_stats job runs

The Connection Broker continues to provision new desktops whenever the lower threshold is crossed, until the upper threshold specified in the **Stop provisioning when total desktops in pool reaches** field is reached, indicated by the **Total** value in the pool size information.

Use the Provisioning Parameters section to configure how Leostream provisions new instances in your Virtuozzo Hybrid Infrastructure project, as follows.

 Select the center associated with your Virtuozzo Hybrid Infrastructure project from the **Provision in** center drop-down menu. The remainder of the form updates based on the contents of your selection. The following figure shows an example of the **Provisioning Parameters** section.

Provision in center	
labs.example.com	~
Virtual machine name	
desktop-{SEQUENCE}	
	Dynamic tags can be us
Display name	
Optionally assign	a Display Name to the desktop record in the Connection Broker. Dynamic tags can be us
Ontional sequence number for virtual machine name	
	Used by the (SEQUENCE) dynamic t
Availability zone	
nova	~
Flavor	
medium	~
Deploy from image	
windows-vdi-image	~
Create new volume	
Delete volume on instance delete	
Volume size (GB)	
40	
	Overrides volume size specified in the selected flav
Volume type	
default	~
Network	

- 2. Enter a name for the virtual machine in the **Virtual Machine Name** edit field. If the pool is defined using names that begin with a certain string, ensure that the **Virtual Machine Name** field starts with that string, as shown in the previous figure for a pool that is composed of all desktops with a name that contains the string desktop.
- 3. Optionally enter a user-friendly display name into the Display name edit field. You can specify in the user's policy if the Connection Broker should display the desktop to the user with its display name instead of virtual machine name.

- 4. If either of the names contains a {SEQUENCE} dynamic tag, enter the starting number for the sequence in the Optional sequence number for virtual machine name edit field. The Connection Broker starts naming virtual machines at this number and increments the number for each machine created.
- 5. Select the availability zone to provision the new instance into from the Availability zone drop-down menu. When using Virtuozzo Hybrid Infrastructure, set the Availability zone to nova.
- 6. Select the instance size from the Flavor drop-down menu. This selection determines the resources allocated to the newly created virtual machines in the pool in regards to vCPU, RAM and Swap. Check your Virtuozzo Hybrid Infrastructure project to view your available flavors or create new flavors that suits your needs.
- 7. Select the master image to use from the Deploy from image drop-down menu. This menu contains all the images available in the Virtuozzo Hybrid Infrastructure project associated with the selected center.
- 8. By default, the Connection Broker creates an instance with ephemeral storage. When provisioning into Virtuozzo Hybrid Infrastructure, indicate that the Connection Broker should create a new volume from the image by selecting the Create new volume checkbox. The form expands to show the fields in the following figure.

Overrides volume size specified in the selected flavor
~

- 8.1. If you are provisioning non-persistent virtual machines, select the **Delete volume on** instance delete checkbox to have the Connection Broker delete the volume along with the instance, when instructed to do so by the user's Release Plan.
- 8.2. In the **Volume size** edit field, Indicate the size of the volume to create if different than that of the selected flavor.
- 8.3. Select the **default** volume type from the **Volume type** drop-down menu.
- 9. Select the network for the new instance from the **Network** drop-down menu. This example adds virtual machines to the VDI-Network.

This example adds virtual machines to a private network without associating a public IP

address. The Leostream Gateway provides connections to the VMs from clients that are outside of the private network.

- 10. In the **Available security groups** field, select the security groups to assign to the new instance. Click the **Add item** button to place them into the **Selected security groups** field.
- 11. If you are provisioning non-persistent virtual machines, select the **Initialize newly provisioned desktops as deletable** option to indicate that the Connection Broker is allowed to delete these instances. When this option selected, the **Edit Desktop** page for the newly provisioned VM has the **Allow this desktop to be deleted from disk** option selected. Use release plans to schedule VM deletion.

For more information on using release plans to terminate virtual machines, see the example on deleting virtual machines see Chapter 11 of the Connection Broker Administrator's Guide.

12. Click Save.

As soon as you save the pool, the Connection Broker checks the Provisioning Limits and will launch virtual machines as required to meet the minimum threshold. You can see the virtual machines in the Virtuozzo Hybrid Infrastructure self-service portal, as shown in the following figure.

Virte	ual machines							
Fi	Iters Search Q						+ Create virtual mac	hine
	Name 🕇	Status 🧅	IP address	vCPUs 4	RAM 4	Storage 🧅	Volumes	¢
	Ceostream AD	Active	10.164.13.84, 10.164.14	4	8 GiB	45 GIB	2	
	Ceostream-Broker	Active	10.164.12.222	4	8 GiB	8 GiB	1	
	Ceostream-Gateway	Active	10.164.11.191	4	8 GiB	8 GiB	1	
	Windows-VDI	Shelved offl	10.164.10.33	2	4 GiB	40 GiB	1	
	🕅 desktop-1	○ Creating	_	2	4 GIB	0 bytes	0	

12.3 Disable Provisioning

If you've set non-zero provisioning limits in your pool and need to temporarily disable provisioning, uncheck the **Provisioning enabled** check box, shown in the following figure.

Provisioning
Provisioning enabled
Provisioning Limits
Start provisioning when unassigned desktops in pool drops below
5
Stop provisioning when total desktops in pool reaches
10

The Connection Broker may automatically disable provisioning in cases where provisioning is failing due to configuration errors in your pool. If this occurs, please check and correct your provisioning parameters before enabling provisioning.

12.4 Joining Instances to Domain

You can use Leostream to join Windows virtual machines to an Active Directory domain. When enabled, the Connection Broker attempts to join the desktop to the domain any time the Leostream Agent on the desktop registers with the Connection Broker, for example, when a desktop is provisioned or when you reboot the desktop.

Before configuring a pool to join desktops to a domain, you must define the Active Directory domain on the **Setup > Authentication Servers** page.

To enable domain joining for a pool:

1. Select the **Join virtual machine to a domain** option in the **Domain Join** section, shown in the following figure.

loin virtual machine to a domain	
Domain	
active directory	
	Contains all Active Directory domains registered on the > Setup > Authentication Serv
Organizational Unit within "active directory"	
OU=floating OU=users OU=vdi DC=vdi DC=vz	

- 2. Select the domain from the **Domain** drop-down menu.
- 3. Optionally, from the **Organizational Unit** drop-down menu, select an OU for the desktops.
- 4. To reset the desktops hostname when joining it to the domain, select the Set desktop hostname to virtual machine name check box. With this option selected, the Leostream Agent attempts to set the hostname to the value shown in the Name column on the Resources > Desktops page.

If the pool provisions new desktops, this is the name found in the **Virtual machine name** edit field. The **Name** field must contain a valid hostname, as follows:

- 4.1. The name uses only the standard character set for Computer Name, which includes letters, numbers, and the following symbols: ! @ # \$ % ^ & ') (. _ { } ~.
- 4.2. Then Name cannot be longer than 15 characters.

Leostream performs the domain join for any desktop in the pool that is not already joined to a domain. Leostream does not have to provision the desktop to perform the domain join.

Offering Virtuozzo Hybrid Infrastructure Desktops to Users

13.1 Defining Pool-Based Plans

After you separate your desktops into pools, define the rules that control how the Connection Broker manages the user's connection to the desktops in those pools. To perform this step, ask yourself the following questions.

- What display protocols do I want to use to connect users to their desktops?
- How do I want to manage the power state of each desktop, for example, should it be powered off when the user logs out?
- How long can users remain assigned to a particular desktop? For example, if the user logs out, should they remain assigned to that desktop, or should another user be able to log in?

Important: The Leostream Connection Broker defines a **pool-based plan** as a set of rules that determine how the Connection Broker manages the connection to a desktop in a pool. This step describes three types of pool-based plans. 1) Protocol, 2) Power Control, and 3) Release. The Connection Broker also provides **location-based plans** for setting registry keys and attaching network printers to the remote desktop. See the Connection Broker Administrator's Guide for information on using location-based plans.

13.1.1 Protocol Plans

Protocol plans determine the display protocol the Connection Broker uses to connect a user to their desktop. The Connection Broker provides one default protocol plan, which is shown on the **Configuration > Protocol** Plans page, shown in the following figure.

Signed in as Administrator	~	Create Proto	col Plan					
Dashboards	~	Actions	Name 🔺	In Use	Leostream API Protocols	Web Browser Protocols		
Setup	~		All ~					
Configuration		Edit	Default	Yes	RDP	RDP		
Configuration		Edit	RemoteApp - Wordpad	Yes	RDP	Leostream HTML5 Viewer		
Pools		Edit	RGS	No	RGS	RGS		
		Edit	TGX	No	Mechdyne TGX	Mechdyne TGX		
Protocol Plans		Edit	VNC	Yes	VNC	VNC		

The Default Protocol Plan instructs the Connection Broker to connect to the remote desktops using Microsoft RDP. For this example, edit the Default protocol plan and use the **Gateway** drop-down menu in the **RDP and RemoteFX** section to indicate that the RDP connection should go through your Leostream Gateway, as shown in the following figure.

LEOSTREAM Θ

Signed in as Administrator	Edit Protocol Plan			This protocol plan is used in these Policies:
Dashboards ~				Default: Hard-assigned desktops
Setup ~	Plan name Default			This protocol plan is used in these Users: fusr01
Configuration ~				This protocol plan is used in these Desktops: Windows-VDI
Pools	Leostream Connect and Thin C	lients Writing to L	eostream API	
Protocol Plans	RDP and RemoteFX	Priority:	1	
Power Control Plans	Command line parameters			
Release Plans	Configuration file			
Policies	screen mode id:i:2 desktopwidth:i:1024 desktopheight:i:768			
	Select			
Roles	✓ Gateway_Leostream			2
Assignments			Opb	inar I
Resources ~	HP ZCentral Remote Boost (RGS)	Priority:	Do not use	-
System ~	NoMachine	Priority:	Do not use	
	VNC	Priority:	Do not use	
This product is licensed to 'Virtuozzo Alliances Team' This license evolves: 2022.12.21	Mechdyne TGX	Priority:	Do not use	
Your support license expires: 2022-12-31	rdesisten	Drioritur	Do not use	
Connection Broker version: 9.1.12.0 Using internal database	rueskiop	Phoney.	bo not use	
Page updated: 2022-03-23 - 14:15:40 Download Technical Support Package	S Web Browser	•		-
	Teradici PCoIP Client Configura	ation		-
	Notes			—
	This is the default protocol plan			
	Save		Cancel	

If needed, you can create a new Protocol Plan by clicking the Create Protocol Plan link. The Create Protocol Plan form is divided into sections based on the type of client device used to log into Leostream, for example, Leostream Connect or the Leostream Web client.

Note that your Connection Broker license determines which display protocols your Connection Broker can use.

In each section, indicate which protocol the Connection Broker should use to connect users to their desktops by selecting 1 from that protocol's Priority drop-down menu. Then, use the Configuration file and Command line parameters to determine how that connection is launched. For example, for RDP, the Configuration file is a list of RDP-file parameters that determine if, for example, the connection is launched in full screen.

For a complete description of protocol plans, see "Building Pool-Based Plans" in the Connection Broker Administrator's Guide.

13.1.2 Power Control Plans

Power control and release plans allow you to take actions on the user's remote session based on different events, such as:

- When the user disconnects from their desktop
- When the user logs out of their desktop
- When the desktop is released to its pool
- When the user's session has been idle for a specified length of time

The remote desktop must have an installed and running Leostream Agent to allow the Connection Broker to distinguish between user logout and disconnect and to perform actions based on idle time.

Power control plans define the power control action to take on a desktop. Available power control plans are shown on the **Configuration > Power Control** Plans page, shown in the following figure.

LEOSTREAM								
Signed in as Administrator	•	Create Powe	er Control Plan					
Dashboards	~	Actions	Name 🔺	In Use	Disconnect Action	Logout Action		
Setup	~		Ali ~					
Configuration	~	Edit	Default	Yes	Do not change power state	Do not change power state		
Configuration		Edit	Reboot on Logout	No	Do not change power state	Shutdown and Start Immediately		
Pools		2 rows						
Protocol Plans								
Power Control Plans								

New Connection Broker installations contain one default power control plan, called **Default**, which leaves the

virtual machine running at all times. You can edit the Default power control plan or create as many additional power control plans as needed for your deployment. To build a new power control plan:

 Click the Create Power Control Plan link on the Configuration > Power Control Plans page. The Create Power Control Plan form, shown in the following figure, opens.

Creat	te Power Con	trol Plan		0	Enter a descriptive name. You'll refer to
Plan nar	ne				this name when assigning the plan to a pool.
When U	ser Disconnects from	m Desktop			
Wait:	0 minutes	→ then	Do not change power state	~	Select the amount of time to wait before
When U	Iser Logs Out of Des	sktop			changing the desktop's power state. A wait
Wait:	0 minutes		Do not change power state	~	time of zero tells the Connection Broker to
When D	esktop is Released				immediately execute the selected power control action
Wait:	0 minutes	→ then	Do not change power state	~	
When D	esktop is Idle				Select the power control action to take
Wait:		 ✓ then 	Do not change power state	~	after the wait time elapses. For the
					Connection Broker to take actions based
Notes			•		on disconnect or idle-time events, you
					must install the Leostream Agent on that
					desktop.
Si	ave Ca	ancel			

- 2. Enter a unique name for the plan in the **Plan name** edit field.
- 3. For each of the remaining sections:
 - 3.1. From the **Wait** drop-down menu, select the time to wait before applying the power action.
 - 3.2. From the **then** drop-down menu, select the power control action to apply. Selecting **Do not** change power state renders the setting in the **Wait** drop-down menu irrelevant, as no action is ever taken.
- Click Save to store the changes or Cancel to return to the Configuration > Power Control Plans page without creating the plan.

13.1.3 Release Plans

Release plans determine how long a desktop remains assigned to a user. When the assignment is released, the desktop returns to its pool, making it available for other users. Available release plans are shown on the **Configuration > Release Plans** page, shown in the following figure.

Note: When a desktop is **assigned** to a user, the Connection Broker always offers that desktop to that user, regardless of where the user logs in, and to no other users. Desktops can be policy- assigned or hard-assigned. For a description of hard-assigned desktops, see the Connection Broker Administrator's Guide.

LEOSTREAM	9					
Signed in as Administrator	~	Create Relea	ase Plan			
Dashboards	~	Actions	Name 🔺	In Use	Unverified User State	Release on Disconnect
Setup	~		All V			
Configuration		Edit	Default	Yes	Logout	No
Configuration		Edit	Disconnect on Idle	No	Logout	No
Pools		2 rows				
Protocol Plans						
Power Control Plans						
Release Plans						

New Connection Broker installations contain one default release plan. The default release plan is designed to keep the user assigned to their desktop until they log out. When the user logs out, the Connection Broker releases the desktop back to its pool. You can create as many additional release plans as needed for your deployment, using the **Create Release Plan** form shown in the following figure.

Create Release Plan	6		
Plan name]◀	Enter a descriptive name for the plan. You'll refe _ to this name when selecting the plan in policies.
When User Disconnects from D Release to pool: Log user out:	esktop No)	 This section controls actions taken when the user disconnects, but remains logged into, their remote desktop.
URL to call When User Logs Out of Desktop Release to pool:	Immediately ~) 4	To model Persistent desktops, set all "Release to pool" options to "No". The Connection Broker offers an assigned desktop only to its assigned user.
URL to call When Connection is Closed Execute actions for: When Desidon is Idle	When User Logs Out of Desktop]	If the Leostream Agent is not installed on the remote desktop, the Connection Broker cannot distinguish a disconnect from a logout event. Fo these cases, configure how to interpret the Clier Close event that is sent by Leostream Connect.
Lock desktop: Disconnect: Log user out:	No No No)) ▲	Idle-time is accumulated when there are no more or keyboard events. When performing logout actions, you can also monitor the CPU level to delay the logout.
When Desktop is First Assigned Release to poot: Release if user does not log in:	No Vinter Destop in Reesson" actors will not be involved)]	Use this section to schedule a release action bas the time of day or at an allotted time after assig To avoid "rogue" users, forcefully log out the use
When Desidop is Released User out of the desidop Delete virtual machine from disk:	No)	when the desktop is released. The "Edit Desktop" page must set the desktop as deletable to use this option.

For example, to build a release plan that schedules a logout one hour after the user disconnects from their desktop and then deletes the virtual machine from your Virtuozzo Hybrid Infrastructure project:

- 1. Enter a unique name for the plan in the **Plan name** edit field.
- 2. To build the Release Plan for our example, in the **When User Disconnects from Desktop** section, select **after 1 hour** from the **Forced Logout** drop-down menu.
- 3. In the **When Desktop is Released** section, select **Immediately** from the **Delete virtual machine from disk** option.
- 4. Click Save.

In this release plan, the Connection Broker forcefully logs the user out an hour after they disconnect from their desktop. The logout event then triggers the **When User Logs Out of Desktop** section of the release plan, which releases the desktop back to its pool. The release action then triggers the **When Desktop is Released** section of the plan, which deletes the VM.

For more details on creating and using release plans, see the "Release Plans" section in Chapter 11 of the Connection Broker Administrator's Guide.

13.2 Building User Policies

After you define pools and plans, you can then build policies.

Note: The Leostream Connection Broker defines a **policy** as a set of rules that determine how desktops are offered, connected, and managed for a user, including what specific desktops are offered, which power control and release plans are applied to those desktops, what USB devices the user can access in their remote desktop, and more.

The Connection Broker provides a **Default** policy that applies if no other policy exists or is applicable. The **Default** policy assigns one desktop from the **All Desktops** pool. You can edit this policy to offer desktops from the pool you created in Chapter 5, as follows.

- 1. Go to the **Configuration > Policies** menu.
- 2. Click the **Edit** link next to the Default policy. The **Edit Policy** form, shown in the following figure, opens.

dit Poli	cy "Default"			(
General	Pool Assignments	Hard Assignments	Rogue User Assignments	Advanced Settings
Policy name Default	9			
Auto-lau	unch remote viewer session	on if only one desktop is	offered (Web client only)	
Launch	HTML5 Viewer and Exter	nal Viewer connections i	in new window (Web client only)	
Hide ho	ver menu when any remo	te desktop is locked (Leo	ostream Connect only)	
Allow m	ultiple selections in Leost	ream Connect dialogs		
Inform u	iser when a pool is out of	resources		
Store user-	configured protocol param	neters		
Individual	y for each connection/clie	nt pair		~]
Maximum n	umber of desktops that c	an be assigned across al	II pools	
<no limit<="" td=""><td>></td><td></td><td></td><td>~</td></no>	>			~
Expire user	's resource offers and Co	nnection Broker session	after specified elapsed time	
2 days				~
Expire u	user's session as soon as	a remote desktop is lock	ced	
Send H	TTP GET request at start	of session		
Notes				
This is the	default policy			
				li
Save				Cancel

3. Go to the **Pool Assignments** tab, shown in the following figure.

dit F	Policy "Def	ault"					(
Gene	ral Pool As	signments	Hard Assignment	ts Rogue Us	er Assignments	Advanced Settings	
Add P	Pool Assignment Pool	Offer	Display to User as	Protocol Plan	Release Plan	Power Control Plan	
:	All Desktops	1	Desktop name	Default	Default	Default	

- 4. Click the kabob menu on the left side of the All Desktops pool and select Edit.
- 5. In the Edit Pool Assignment form, use the Pool menu to select the pool you created previously. When a user is offered this policy, the Connection Broker sorts the desktops in the selected pool based on the other policy settings, then offers the user the top n desktops from the pool, where n is the number selected in the Number of desktops to offer drop-down menu.

Scroll down to the **Plans** section and notice that the policy already uses the default protocol, power control, and release plans. If you created new plans, use the drop-down menus in this section to select your plans.

6. Click **Save**.

Use the **Create Policy** link at the top of the **Configuration > Policies** page to create new policies. You can create as many policies as you need to model the different VDI workflows in your organization, however each user is assigned to one policy. If users need access to multiple pools, add those pools to the user's policy.

For a complete description of setting up policies, see "Configuring User Experience by Policy" in the Connection Broker Administrator's Guide.

13.3 Assigning Policies to Users

When a user logs in to the Connection Broker, the Connection Broker searches the authentication servers you defined on the **Setup > Authentication Servers** page for a user that matches the credentials provided by the user.

The Connection Broker then looks on the **Configuration > Assignments** page for the assignment rules associated with the user's authentication server. For example, if the Connection Broker authenticated the

user in the VDI.VZ domain defined on the **Setup > Authentication Servers** page, the Connection Broker would look in the VDI.VZ assignment rules.

To assign policies to users in a particular authentication server, click the **Edit** link associated with that authentication server on the **Configuration > Assignments** tab. The **Edit Assignment** form for this authentication server appears, for example as shown in the following figure.

Domain n eostrear	name n.net										
Assign n this se	ing User Role and Policy action you can set up rules to assi	ign Users to Roles and Poli	icies	based on their group	memb	ership	Optionally us	se the Or	der	column to re-order the	e rov
Order	Group		0	Client Location			User Role			User Policy	
1	[any group]	~	+ (Leostream Connect	~	-	User	~	&	Multiple Resources	
2	[any group]	~	+ (All	~		User	~	&	RemoteApp	
3		~	+ (All	~	→	User	~	&	Default	
4		~	+ (All	~		User	~	&	Default	
5		~	+ (All	~		User	~	&	Default	
[Add rov	vs]										
)efault R	ole										
User											,
)efault P	olicy						Users will I	e assigned to	this r	role if they do not match an assign	ment
Default									-		,

By default, the Connection Broker matches the selection in the **Group** drop-down menu to the user's memberOf attribute in Active Directory.

Note: If you modified your groups in Active Directory after you last signed into your Connection Broker, you must sign out and sign back in to have your Connection Broker reflect the authentication server changes.

To assign policies based on the user's memberOf attribute:

- 1. Select the group from the **Group** drop-down menu.
- 2. If you are using locations, select a location from the **Client Location** drop-down menu.

3. Assign a role to this group and client location pair by selecting an item from the **User Role** drop-down menu.

In Leostream, roles are permissions that control the actions an end user can take on their desktop and the level of access the user has to the Connection Broker Administrator Web interface. A location is a group of clients defined by attributes such as manufacturer, device type, OS version, IP address, etc. For more information on building roles and locations, see Chapters 10 and 13 in the Connection Broker Administrator's Guide.

4. Assign a policy to this group and client location pair by selecting an item from the **User Policy** drop-down menu.

Leostream supports various different multi-factor authentication systems. If you require MFA, visit the Support Documents tab on the Leostream Documentation page for more information.

If you edit the Default policy, you can leave your Assignments table at its default values and proceed with the example.

13.4 Testing Connection Broker Configuration

To test your Connection Broker, ensure that users are being assigned to the correct policy, and offered the correct desktops. You can test user logins before the user has ever logged into, and been loaded into, Leostream.

- 1. Navigate to the **Resources > Users** menu. As users log into your Leostream environment, their user information is added to this page. You do not need to load users before they can log in.
- 2. Click the **Test Login** link at the top of the page, shown in the following figure.

LEOSTREAM	9				
Signed in as Administrator		Create User	Test Login		
Dashboards					
Setup			Actions	Name 🔺	Login Name
Configuration			Edit Sign out Test login	Administrator	admin
Resources	~				
Desktops					
Images					
Users					

- 3. In the **Test Login** form that opens, enter the name of the user to test in the **User Name** edit field.
- 4. If you are allowing the user to specify their domain, select a domain from the **Domain** drop-down.
- 5. Click **Run Test**. The Connection Broker searches the authentication server for your user, and then presents a report, for example:

Test Results	
User name:	Maybel
Authentication server.	Leostream
Domain:	leostream.net Chrome (0.10.0 (McA. Provider) et 10.110.2.40
Cilent.	Childree 51 of web blockers at 10 - 10 - 40 (This client is in these locations: Web browsers, All)
	·
Looking up user "May	/bel":
in authentication set	rver "Leostream" ← found user (show Active Directory attributes)
Trying to match with A	Authentication Server Assignment rules: (edit)
1: "memberOf" exac	ctly matches "CN=Karen Test Sub Group, OU=Karen Test, OU=Karen Groups, DC=leostream, DC=net", location "All" ← no attribute match
2: "memberOf" exac	ctly matches "CN=Students,OU=Security Groups,DC=leostream,DC=net", location "All" matched
User must first susser	Over and Policy Detaun
User's role provides a	souri auternatia win RADIOS server Oka RADIOS Agent — Pin+token not provided
Coel o fole provideo a	loceas to treb client, only.
Policy: Default (edit)
No hard-assigned des	sktops found
Pool "All Desktops"	(edit)
Including pool for all u	Users
Looking for two deskt	ODS
Policy settings for this	s pool;
- follow-me mode	
- do not allow users	to change power state of offered desktops
- offer powered-on d	lesktops without a running Leostream Agent
- do not offer stoppe	d/suspended desktops
- favor previously-as	signed desktops
- may offer desktops	with pending reboot job
- do not confirm desi	ktop power state
- do not power on st	opped desktops
- do not log out rogu	e users
- do not attempt sing	ale sign-on into desktop console session
- allow manual relea	se (but Maybel's role prevents it)
 Power control plan: 	Default
- when user discon	nects, do not change power state
 when user logs or 	ut, do not change power state
 when desktop is n 	eleased, do not change power state
- when desktop is in	dle, do not change power state
- Release plan: Defa	sult
 handle unverified 	user state as disconnect
 do not release on 	disconnect
 do not log user ou 	ut on disconnect
 when user logs out 	ut, release immediately
 do not lock deskto 	op if idle
 do not disconnect 	t user if desktop is idle
 do not log user ou 	at if desktop is idle
 do not release aft 	er initial assignment
 if user does not lo 	ng in, release
(389 total, 383 in serv	rice, 18 policy filtered, 18 pool filtered, 18 available, 8 running, 8 with an IP address)
kdg-debian9 ← avai	lable, running, Leostream Agent v5.1.22.0, will offer as: "kdg-debian9", will connect via RDP (show) will use protocol plan "Default" associated with policy Default
kdg-1803 ← avai	Iable, running, Leostream Agent v7.3.13.0, will offer as: "kdg-1803", will connect via RDP (show) — will use protocol plan "Default" associated with policy Default
Offering two deal-tons	with the policy
Onering two desktops	a mini una poneg.

See "Testing User Role and Policy Assignment" in the Connection Broker Administrator's Guide for information on interpreting test login results.

Important: Please complete a login test and ensure that your user is offered the correct policy, protocol plan, and desktop before proceeding.

Connecting Virtual Desktop Using Leostream

Before attempting to connect to one of your virtual machines using Leostream, ensure that you are able to connect to the VM directly. For example, ensure that you can establish an RDP connection to the desktop from another VM on the same network.

You can connect to the virtual desktop using either the HTML5 client available in the Leostream Gateway or using a client-based protocol launched by either the Leostream Web client or the Leostream Connect client. This example uses the Leostream Connect client, which is available on the Leostream Downloads page. Consult the Leostream Installation Guide for information on installing Leostream Connect.

After installing and launching the client, provide the FQDN or IP of your Leostream Gateway (if your Leostream Gateway is actively forwarding to your Connection Broker, as done in this example) or enter your Connection Broker FQDN or IP. Click the **Test** button to ensure that the client can communicate with the Connection Broker, as shown in the following figure.

0 0	Options		
	Broker Viewer	s Log	
Connectio	on Broker		
Obta	ain Connection Broker addre	ess automatically	
Address	:		
labs.gate	way.example.com	0	Test
Enter a F	QDN or IP address.		

0 0	Options
	Broker Viewers Log
Connect	ion Broker
Ob	tain Connection Broker address automatically
	Leostream Connect
	Successfully contacted the Connection Broker.
	ОК
sion 3.7.6.0	OK Cancel

Now, go to the **Login** dialog and enter the username and password of an Active Directory user, for example:

Login user
LEOSTREAM >Connect
User name: fusr01@vdi.vz Password:
•••••
Options Login Cancel

If the user's policy offers a single desktop, the desktop connection launches automatically, for example:



Leostream Official Documentation and FAQs

Leostream knowledge base: https://support.leostream.com/support/solutions

Ports used in a Leostream Environment: https://support.leostream.com/support/solutions/articles/ 66000460684-network-ports-used-in-a-leostream-environment

Leostream Connection Broker FAQ/Troubleshooting: https://support.leostream.com/support/solutions/folders/66000395808

Leostream Gateway FAQ/troubleshooting: https://support.leostream.com/support/solutions/folders/66000397758

Leostream Agent FAQ/troubleshooting: https://support.leostream.com/support/solutions/folders/66000397493

Leostream Connect FAQ/troubleshooting:

https://support.leostream.com/support/solutions/folders/66000397771

Leostream Administration Guide (march 2022 version, even if it appears under the 2018 folder): https://leostream.com/wp-content/uploads/2018/11/leostream-9-administrators-guide.pdf