

# leostream

Remote Desktop Access Platform

## **Leostream Quick Start for Virtuozzo Hybrid Infrastructure (VHI)**

**Advanced Capacity Automation, Connection Management, and Remote Access**

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## Patents

Leostream software is protected by U.S. Patent 8,417,796.

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## Chapter 1: Introduction

### Using the Leostream® Platform with Virtuozzo Hybrid Infrastructure (VHI)

The Leostream® Remote Desktop Access Platform lies at the heart of any hosted desktop deployment, providing crucial remote access and desktop connection management for hybrid environments. When paired with [Virtuozzo Hybrid Infrastructure \(VHI\)](#), the solution enables cloud service providers and managed service providers to build, secure, and manage Virtual Desktop Infrastructures (VDI) and Desktops as a Service (DaaS) offerings.

When using Leostream to manage VDI or DaaS with VHI as your Infrastructure as a Service (IaaS) provider, you can:

- 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 out and in 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 IaaS providers from a single management console.
- Define granular virtual desktop access control rules, using Leostream policies, plans, and assignments.
- Provide clientless access using the built-in HTML5-based RDP, VNC, and SSH viewer.
- Monitor Leostream environment metrics and send updates via a defined SMTP server.
- Control user access based on location, for example, internal vs external network access.
- Generate Reports for resource usage, login history, assignment, and Connection Broker metrics.

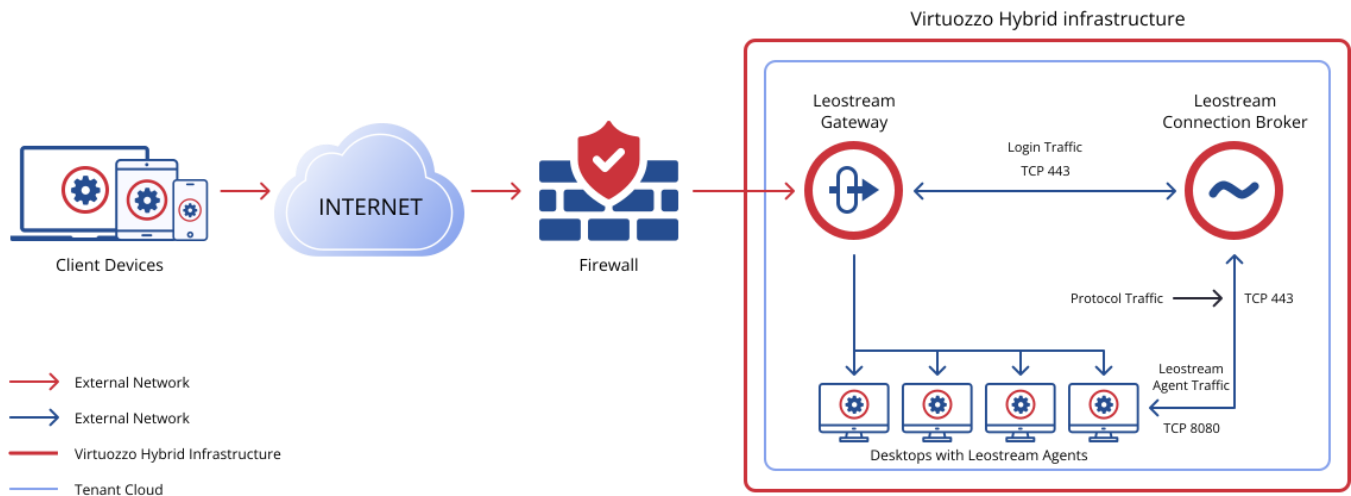
## The Leostream Platform Components

The Leostream Platform is comprised of a set of components, including the Connection Broker, Leostream Gateway, Leostream Agent, and Leostream Connect client.

- **Connection Broker:** The main application that manages the hosted desktop environment. The Connection Broker is the central management layer for configuring your deployment, including inventorying and provisioning desktops, assigning and connecting users to these desktops, and defining the end-user experience. The Connection Broker also includes a web portal for users to access their hosted resources.
- **Leostream Gateway:** A secure gateway that provides VPN-less access to virtual desktops behind a secured zone. The Leostream Gateway provides a built-in HTML5-based viewer for clientless remote access for users connecting to their remote desktop. The Leostream Gateway also provides gateway functionality for protocols such as RDP, HP ZCentral Remote Boost, Amazon DCV, and Mechdyne TGX, to connect users to desktops hosted in a network that is isolated from the user's client device.
- **Leostream Agent:** When installed on the remote desktop, the Leostream Agent provides the Connection Broker with insight into the connection status of remote users, including when they log out, disconnect, or are idle on their desktop. The Agent also manages enhancements such as redirecting network printers and joining virtual machines to Active Directory domains. The Leostream Agent is available for Microsoft Windows, Linux and macOS operating systems. For more details, see the [Leostream Agent Administrator's Guide](#).
- **Leostream Connect:** A software client provided by Leostream that allows users to log into your Leostream environment and access their hosted resources from fat or thin clients. Using Leostream Connect, you can repurpose existing desktops and laptops as client devices, lowering the cost of VDI deployments. Some thin clients provide built-in Leostream Connect clients. For more details, see the [Leostream Connect Administrator's Guide](#).
- **Database:** The Connection Broker stores all information in an internal PostgreSQL database. A large-scale, redundant production environment requires an external PostgreSQL, Azure SQL, or Microsoft® SQL Server® database.

## Architectural Diagram

The following figure depicts a high-level architecture for a typical Leostream deployment on VHI.



## Overview of the Example in this Guide

This Quick Start guide steps through configuring VHI for use with Leostream, integrating Leostream with VHI, and configuring a baseline VDI deployment, including:

1. Creating the Domain, Users and Project on VHI
2. Creating the necessary networks for the Leostream Infrastructure (labeled VDI-network, AD-Network, Gateway-Network and Broker-Network, in this example)
3. Creating a Router (with SNAT enabled on the above networks)
4. Creating two Linux VMs, one for the Connection Broker and another for the Leostream Gateway
5. Creating a Floating IP for the Leostream Gateway VM
6. Building and importing Master Windows images.
7. Installing the Leostream Gateway and assigning the floating IP
8. Installing the Leostream Connection Broker
9. Configuring the Leostream Gateway for Connection Broker forwarding.
10. Configuring the Leostream Broker, including integrating with VHI, building pools that manage capacity in VHI, defining Active Directory authentication servers, configuring plans and policies for user assignment to pools
11. Testing user logins
12. Using the Leostream Connect Client to connect to remote desktops

## Prerequisites

Before you begin, ensure that you obtain the following information.

- The OpenStack API endpoint required by Leostream in order to manage VHI. This endpoint typically takes the following form:

```
https://external_openstack_ip:5000/v3
```

- A user with admin rights for VHI, which you will use to create the Domain, Users and Project described in the next section. The project in VHI must include enough resources for the Leostream components and the VDI infrastructure.
- An image for Red Hat® Enterprise Linux® 8.x operating system or one of its derivatives such as Rocky Linux and AlmaLinux OS, to make available to your VHI project.
- A VM with Active Directory configured.
- A Windows Virtual Machine to use to create your master image for provisioning in pools.
- A Leostream Serial Number to generate the License.

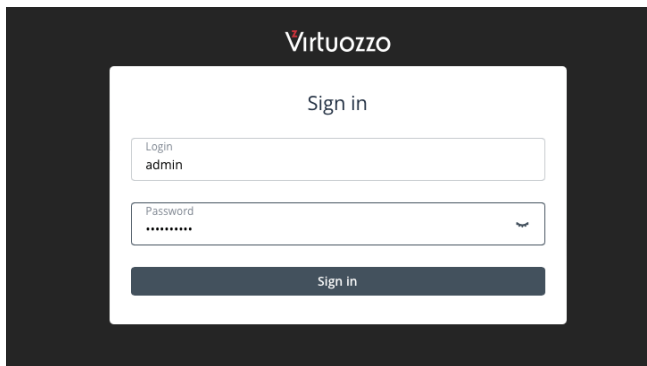


## Chapter 2: Configuring VHI for use with Leostream

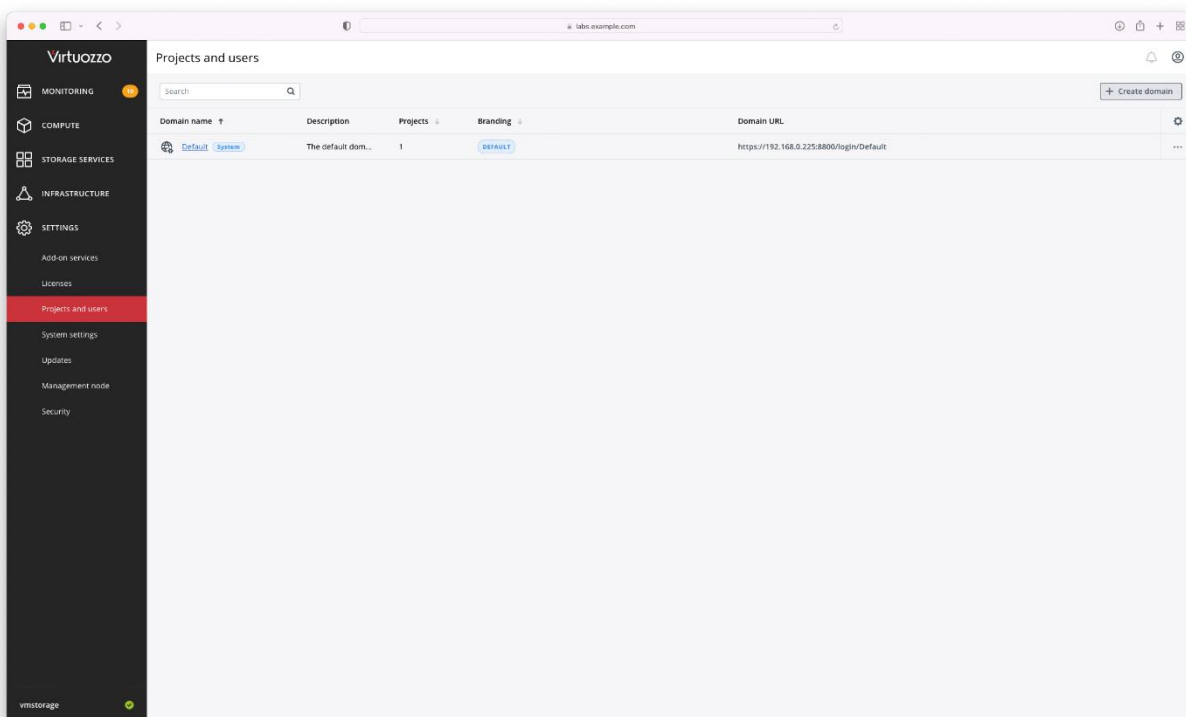
You must complete some basic configuration in VHI prior to installing Leostream and configuring your VDI environment, as described in the following procedures.

### Creating Domains, Projects, and Users

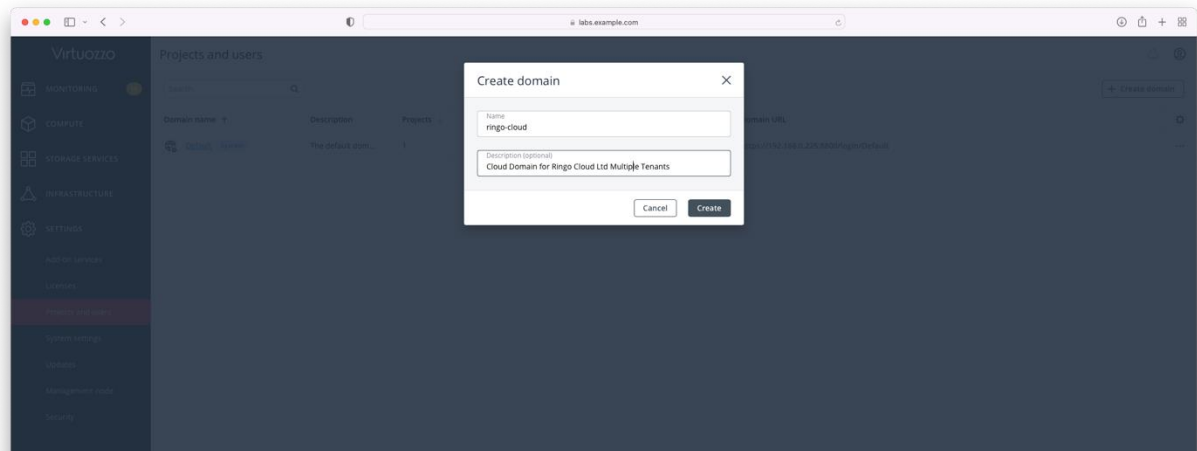
1. Login to the VHI admin panel, shown in the following figure.



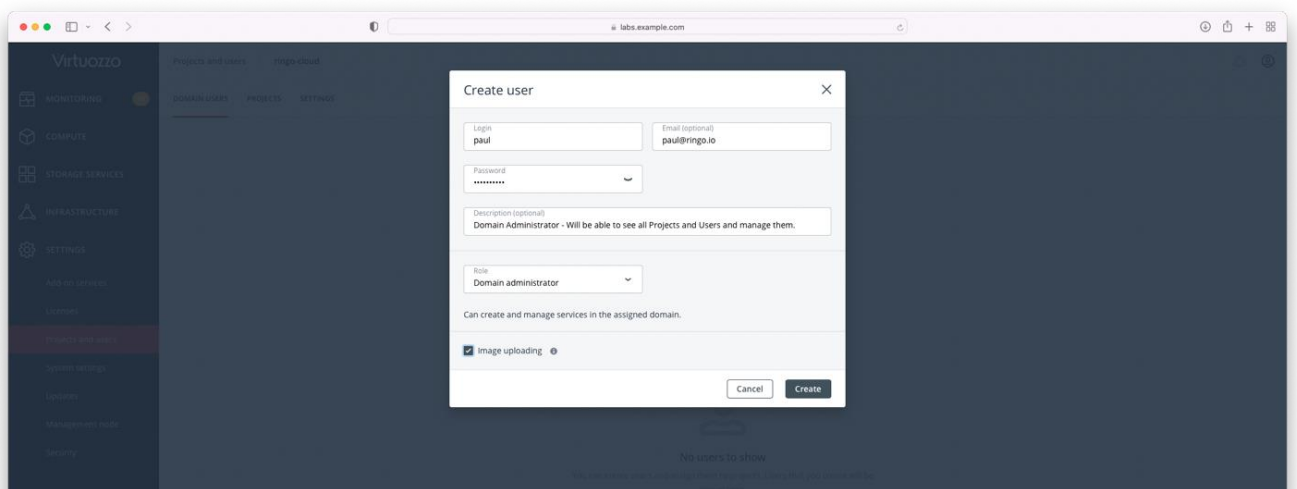
2. Navigate to **Settings > Projects and Users** in VHI and click **Create domain**.



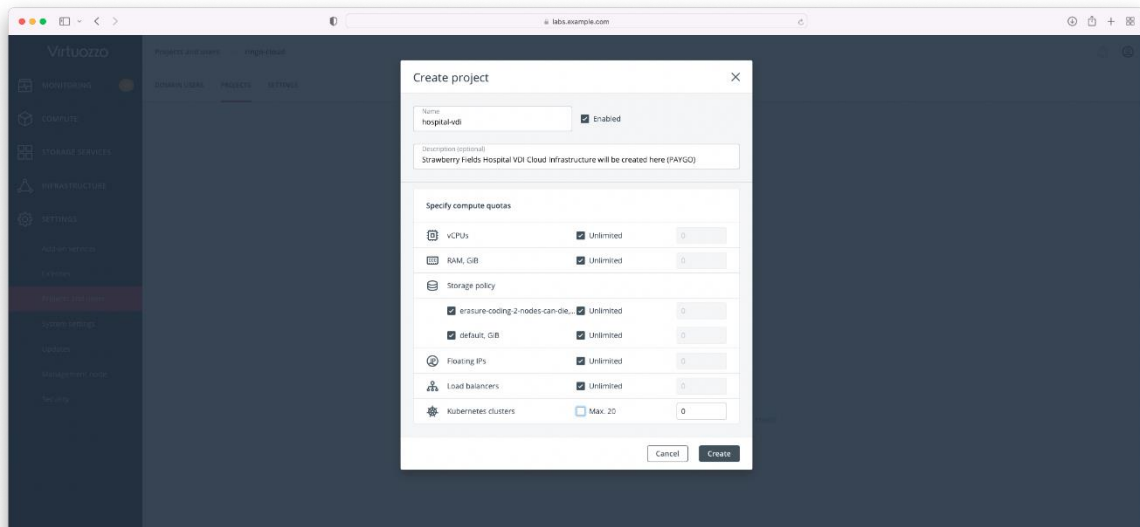
3. In the **Create** domain form, shown in the following figure, enter a **Name** and **Description** for the Domain you will use to host our users and projects (tenants), and click **Create**.



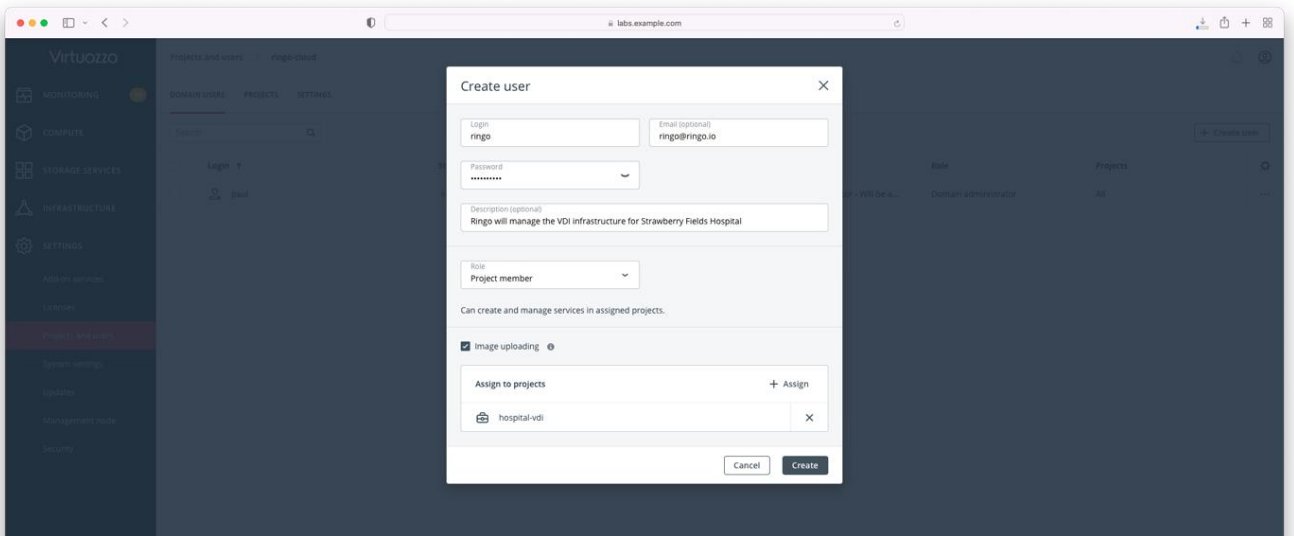
4. Select your new domain on the **Settings > Project and users** page and go to the **Domain users** tab. Click **Create user** to create a Domain administrator. Specify the **Login**, **Password**, and optionally email address and description. Ensure that you select **Domain administrator** from the **Role** drop-down menu, as shown in the following figure.



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.

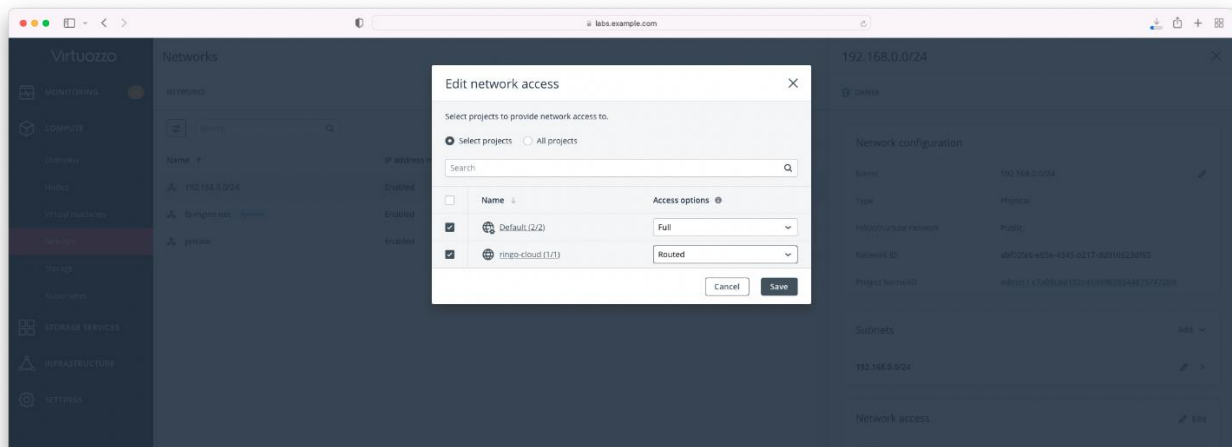


6. Select your new domain on the **Settings > Project and users** page and go to the **Domain users** tab. Click **Create user** to create a Project user. Specify the **Login**, **Password**, and optionally email address and description. Ensure that you select **Project member** from the **Role** drop-down menu, as shown in the following figure



7. 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**.
8. Go to the **Compute > Networks** page to enable your project to access the external network and a pool of Floating IP addresses.
  - a. Select your external network
  - b. From the panel on the right, click **Edit** in the **Network access** section

- c. Ensure your new project is selected in the **Edit network access** form, as shown in the following figure.

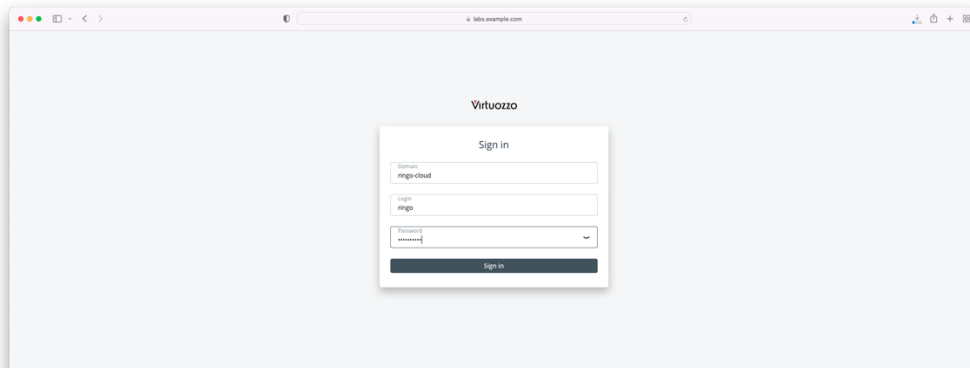


## Creating Networks for the Leostream Infrastructure

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:

`http://<admin_panel_virtual_IP_address>:8800`

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

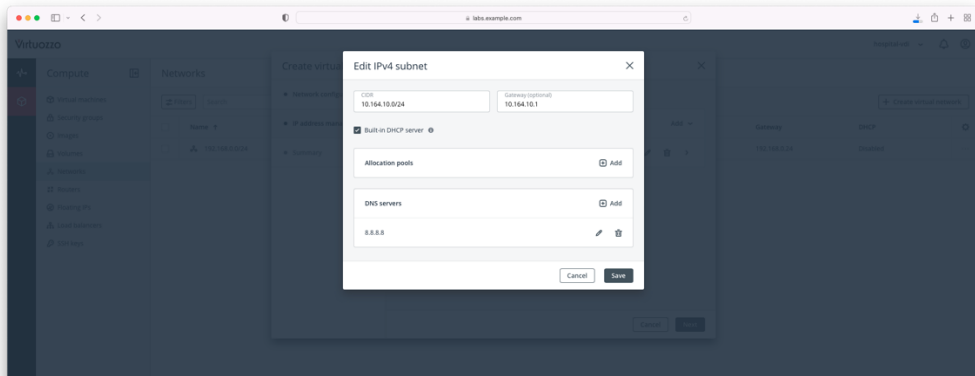


2. Go to the **Networks** page to create four networks for your deployment:
  - a. VDI-network
  - b. AD-Network
  - c. Gateway-Network
  - d. Broker-Network

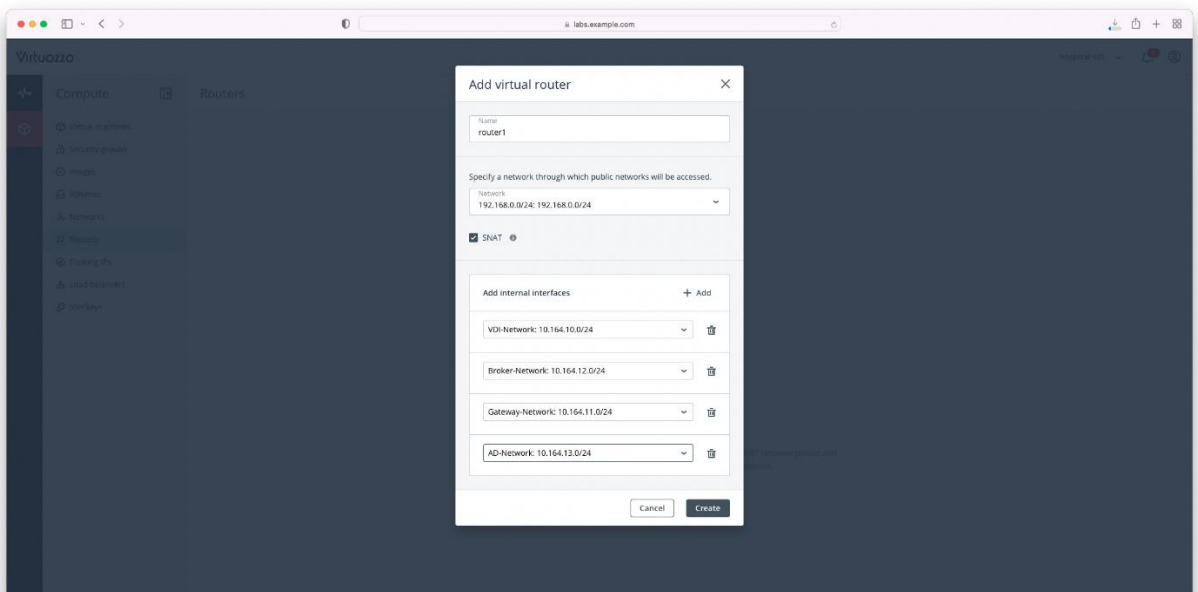
Click the **Create virtual network** button and proceed through the wizard to configure the networks as per your requirements. For more info on how to create networks check here [Creating Compute Networks](#) and look for the steps to create a virtual network.



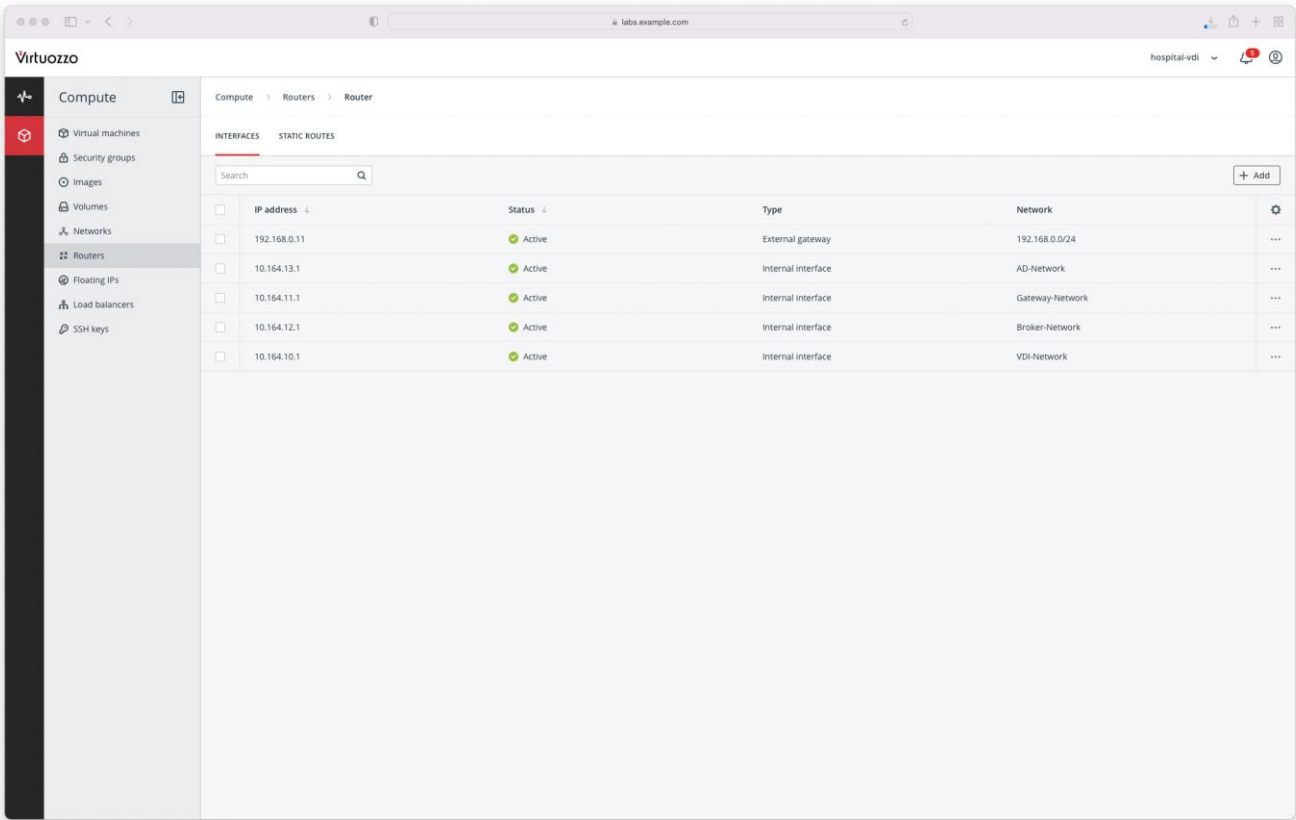
When configuring the VDI-network, if you are integrating with Active Directory, add your Active Directory as your DNS Server for the VDI-network, as shown in the following figure.



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 to access the internet. For more information, see [Creating virtual routers](#).



When complete, your virtual router appears similar to the example shown in the following figure.



## Chapter 3: Installing Leostream in VHI

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](#).

### Security Group Requirements

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

1. Connection Broker
2. Leostream Gateway
3. VDI instances

Port	Required By	Purpose
22	Connection Broker, Leostream Gateway	For SSH access to the Connection Broker or Leostream Gateway, if required.
443	Connection Broker, Leostream Gateway	For access to the Connection Broker Web interface, and 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 - 22000	Leostream Gateway	The Leostream Gateway uses this default port range to 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.  <b>NOTE:</b> 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 Gateway	For RDP access to the VDI/DaaS instances  ** 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.

## Creating Connection Broker and Leostream Gateway VMs

The Connection Broker can be installed on any virtual or physical machine running the latest Red Hat® Enterprise Linux® 8.x operating system and its derivatives such as Rocky Linux and AlmaLinux OS.



The Connection Broker does not install on CentOS 8, on any operating system based on Fedora, 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.

- 2 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 2.5 GHz 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 the VMs, go to the **Compute > Virtual Machines** page and click **Create Virtual Machine**. For complete instructions, see [Creating virtual machines](#).

When creating the virtual machines, ensure that the Connection Broker VM has access to the `Broker-Network` and the Leostream Gateway VM has access to the `Gateway-Network`, by attaching the network when stepping through the VM creation wizard. You can attach the network after the VMs are created, if necessary.

## Assigning a Floating IP Address to the Leostream Gateway

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.

1. From the self-service portal, go to **Compute > Floating IPs** and click **Add** to allocate a new floating IP to your project.
2. Click the ellipsis 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.

## Installing the Leostream Gateway

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



### Leostream Gateway.

```
curl http://downloads.leostream.com/gateway.sh | bash
```

```
[centos@leostream-gateway ~]$ curl http://downloads.leostream.com/gateway.sh | bash
% Total % Received % Xferd Average Speed Time Time Time Current
Dload Upload Total Spent Left Speed
100 377 100 377 0 0 1451 0 --:--:-- --:--:-- --:--:-- 1450
Detected operating system as centos/7.
Checking for curl...
Detected curl...
A unique ID was not specified, using the machine's hostname...
Found unique id: leostream-gateway
Downloading repository file: https://a6f7634fb8c34178294d1e5e905f70dfbb5cd878ca899e10:packagecloud.io/install/repositories/leostream/gateway/config_file.repo?os=centos&dist=7&name=leostream-gateway&source=script
done.
Installing pygpgme to verify GPG signatures...
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
* base: mirror.fra10.de.leaseweb.net
* epel: mirror.23m.com
* extras: mirror.23m.com
* updates: mirror.fra10.de.leaseweb.net
leostream_9_0_prod/x86_64/signature | 833 B 00:00:00
leostream_9_0_prod/x86_64/signature | 1.8 kB 00:00:00 !!!
leostream_9_0_prod-source/signature | 819 B 00:00:00
leostream_9_0_prod-source/signature | 951 B 00:00:00 !!!
```

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

## Installing the Connection Broker

Prior to installing your Connection Broker, install the latest updates on the operating systems. You can then download the Connection Broker installation file from the following page.

<https://license.leostream.com/download.html>

When you visit the Leostream downloads page, the following login dialog appears.

Leostream downloads

Serial number

This is the serial number sent to you by Leostream sales or support

Email address

The email address associated with your Leostream license

Access downloads


To view your permissible downloads:

1. Enter your Leostream Serial number.
2. Enter the Contact email address associated with your serial number. If you do not know your Contact email address, please contact [sales@leostream.com](mailto:sales@leostream.com).

After building your base operating system and applying all updates, copy the downloaded Connection Broker RPM into your user's home directory. You can then use the following two commands to install or upgrade your Connection Broker.

```
sudo dnf -y install RPM_FILENAME
sudo /sbin/reboot
```

Where *RPM\_FILENAME* is the name of the RPM file you copied onto the machine.

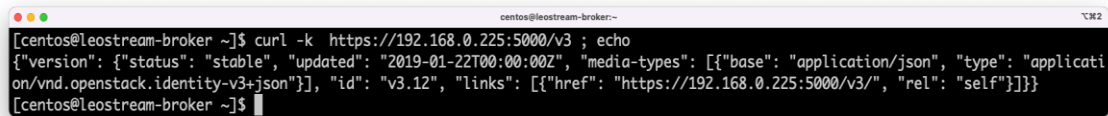
 The Leostream package attempts to install all dependencies prior to installing the Connection Broker. In order for the Leostream package to install other dependencies, ensure that the machine has access to a local Linux repository or the internet.

If you need to install all dependencies manually, you can run the following command for a flat list of packages.

```
rpm -q --requires leostream-broker
```

After the installation completes, ensure that your Connection Broker can access the OpenStack API endpoint in order to manage VHI. 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 ; 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": "application/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 VHI 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

## 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.



```
root@leostream-gateway:~  
[root@leostream-gateway ~]# leostream-gateway --broker 10.164.12.222  
Connection Broker forwarding is enabled  
[root@leostream-gateway ~]#
```

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

## Licensing your 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](mailto:sales@leostream.com).

To obtain your license key:

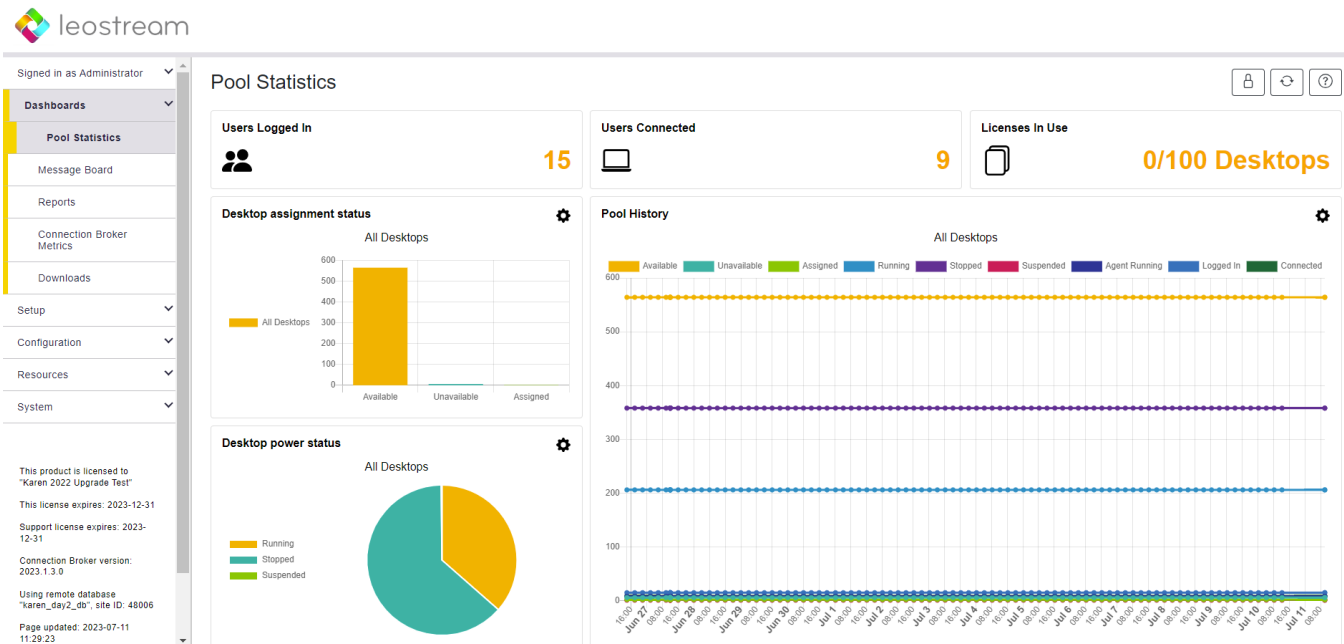
1. Point a web browser at the IP address of the machine running the Connection Broker. The Connection Broker **Sign In** page opens.
2. Log into your Connection Broker using the following default administrator credentials:  
  
`username=admin`  
`password=leo`
3. On the **Leostream License** page, select **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**.
8. 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**.

If your Connection Broker does not have internet access, you can obtain your license key from another computer with internet access. In this case, to obtain your license:

1. Note your Connection Broker installation code to the right of the form on the **Leostream License** page.
2. Go to <https://license.leostream.com> and manually enter your serial number, installation code, and email address.
3. Copy the license key to a text file.
4. Return to your Connection Broker and copy-and-paste the key into the **License key** field.

 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](mailto: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.



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, VHI, 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 VHI.
- **System** configures system parameters, such as SNMP, Alerts, Backups, add SSL certificates.

## Changing the 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.

The screenshot shows the 'My Options' page in the leostream interface. The sidebar on the left indicates the user is signed in as Administrator and provides navigation links. The main panel is divided into 'Display Options' and 'My Information'. The 'My Information' section contains input fields for email, password, and password confirmation, along with a 'Save' button.

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**.



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.

## Chapter 4: Preparing Master Images

Leostream can manage connections to existing virtual machines and provision new virtual machines from existing VHI images.

---

*Currently, you cannot create new images within the Leostream interface. All images must be created using native VHI tools.*

---

### 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 1.8, or later:
  - CentOS
  - Debian
  - Fedora
  - SUSE Linux Enterprise
  - Red Hat Enterprise Linux
  - Ubuntu
  - macOS

When creating instances within VHI, 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](#).

### Installing the 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 VHI 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.

## Requirements for Performing Domain Joins

If you plan to use Leostream to provision new Windows instances in VHI 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.

## Chapter 5: Integrating with External Systems

### Connecting to Your 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 a name for this server in the Connection Broker in the **Authentication Server name** edit field.
5. In the **Domain** edit field, enter the domain name associated with this Active Directory server.
6. In the **Connection Settings** section, shown in the following figure, use the following procedure to integrate with your Active Directory authentication server.

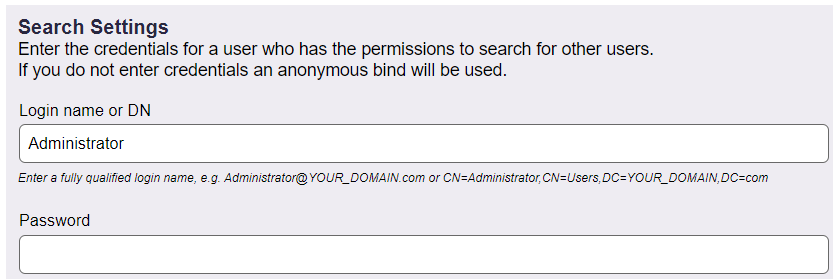
The screenshot shows the 'Connection Settings' section of a web interface. It contains the following elements:

- A dropdown menu labeled 'Specify address using' with 'Hostnames or IP addresses' selected.
- Two input fields: 'Hostname or IP address' and 'Port'. The 'Port' field contains the value '389'.
- A small text note: 'If using multiple addresses, separate each entry with spaces'.
- A dropdown menu labeled 'Algorithm for selecting from multiple addresses' with 'Random' selected.
- A small text note: 'The sequential algorithm uses the first working address in the list'.
- A checkbox labeled 'Encrypt connection to the authentication server using SSL (LDAPS)' which is currently unchecked.
- An input field labeled 'AWS Directory ID'.
- A small text note at the bottom: 'Enter the Directory ID if this is an AWS directory that will be used for a Amazon Workspaces'.

- a. From the **Specify address using** drop-down menu, select **Hostname or IP address**.
- b. Enter the authentication server hostname or IP address in the **Hostname or IP address** edit field.
- c. Enter the port number in the **Port** edit field.
- d. Check the **Encrypt connection to authentication server using SSL (LDAPS)** checkbox if you need a secure connection to the authentication server. The port number automatically changes to 636. Re-edit the **Port** edit field if you are not using port 636 for secure connections.



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 user who has the permissions to search for other users.  
If you do not enter credentials an anonymous bind will be used.

Login name or DN  
  
Enter 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**.

## Integrating with VHI

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

---


 *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 VHI project.

To integrate with VHI:

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.

 Your Leostream license controls if OpenStack is available as a center.

4. Enter a name for the center in the **Name** edit field.
5. In the **Auth URL** edit field, enter the VHI OS\_AUTH\_URL, for example:

`https://virtuozzo.admin.panel.ip:5000/v3`

6. Enter the default 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 Chapter 2 into the **User Domain**, **Username** and **Password** edit fields, respectively.
10. Click **Save** to create the center.

The instances in the VHI project appear in the > **Resources** > **Desktops** page. The Connection Broker inventories all images and displays them on the > **Resources** > **Images** page.

## Adding the Leostream Gateway

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

1. Go to the **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 the 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.



The option you select here has ramifications on the ports you must open in the Security Group assigned to your Leostream Gateway virtual machine.

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.

## Chapter 5: Pooling and Provisioning in VHI

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 VHI project
3. Indicating the desktops that a user may connect to and how the Connection Broker manages the user's connection to those desktops

### Creating Pools

When using Leostream to provision new instances in VHI, 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 VHI 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:
  - a. Select **Name** from the **Desktop attribute** drop-down menu.
  - b. Select **begins with** from the **Conditional** drop-down menu.
  - c. 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`.

**Create Pool** ?

Name  
Floating Pool

Display name  
Floating Pool

Pool Definition

Subset of pool  
All Desktops

Define pool using  
Desktop attributes

Desktop attribute	Conditional	Value
Name	begins with	desktop

[Add rows]

☐ The desktops must match any of the attribute rules (OR)  
☒ The desktops must match all of the attribute rules (AND)

☒ Associate initial user login with assigned user  
Executes assigned user's Power Control and Release Plans for the first user who logs into desktops in this pool

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](#).

## Provisioning New Instances

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



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 VHI project. To begin, check the **Provisioning enabled** checkbox, as shown in the following figure.

**Provisioning**

☒ Provisioning enabled

**PROVISIONING LIMITS**

Start provisioning when unassigned desktops in pool drops below

1

Stop provisioning when total desktops in pool reaches

2

☐ Enforce provisioning limits (automatically create and delete available machines to meet thresholds)

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 VHI project, as follows.

1. Select the center associated with your VHI 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.

**PROVISIONING PARAMETERS**

Provision in center  
labs.example.com

Virtual machine name  
desktop-{SEQUENCE}

Display name

Optional sequence number for virtual machine name  
0

Availability zone  
Select ...

Flavor  
Select ...

Deploy from image  
Select ...

☐ Create new volume

Network  
Select ...

☒ Associate floating IP (allocate new IP, if necessary)

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 VHI, 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 VHI 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 VHI project associated with the selected center.
8. By default, the Connection Broker creates an instance with ephemeral storage. When provisioning into VHI, 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.



The screenshot shows a form titled "Create new volume" with a purple header bar. Below the title is a checkbox labeled "Delete volume on instance delete". Underneath is a text input field labeled "Volume size (GB)". To the right of this field is a small note: "Overrides volume size specified in the selected flavor". At the bottom is a dropdown menu labeled "Volume type" with the text "Select ..." and a downward arrow.

- a. 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.
  - b. In the **Volume size** edit field, Indicate the size of the volume to create if different than that of the selected flavor.
  - c. 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 VHI self-service portal, as shown in the following figure.

Virtual machines								
Filters		Search						
<input type="checkbox"/>	Name ↑	Status ↓	IP address	vCPUs ↓	RAM ↓	Storage ↓	Volumes	
<input type="checkbox"/>	Leostream AD	Active	10.164.13.84, 10.164.14....	4	8 GiB	45 GiB	2	...
<input type="checkbox"/>	Leostream-Broker	Active	10.164.12.222	4	8 GiB	8 GiB	1	...
<input type="checkbox"/>	Leostream-Gateway	Active	10.164.11.191	4	8 GiB	8 GiB	1	...
<input type="checkbox"/>	Windows-VDI	Shelved offl..	10.164.10.33	2	4 GiB	40 GiB	1	...
<input type="checkbox"/>	desktop-1	Creating	—	2	4 GiB	0 bytes	0	...

## Disabling 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
 
  
 Stop provisioning when total desktops in pool reaches

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.

## Joining Instances to a 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.



**Domain Join**  
Applies to desktops that are not already a member of a domain when the desktop registers with the Connection Broker.

☒ Join machine to a domain

Domain  
leodev.net (Leostream)  
Contains all Active Directory domains registered on the > Setup > Authentication Servers page

Organizational Unit within "leodev.net (Leostream)"  
Select ...  
Optional

Available AD groups to join

- ADSyncAdmins
- ADSyncBrowse
- ADSyncOperators
- ADSyncPasswordSet
- Access Control Assistance Operators
- Account Operators
- Administrators
- Allowed RODC Password Replication Group
- Backup Operators
- Cert Publishers
- Certificate Service DCOM Access
- Cloneable Domain Controllers

Selected AD groups to join  
Optional

☐ Set desktop hostname to machine name

☐ When virtual machine is permanently deleted, also remove it from the domain

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 add the desktop to one or more AD groups, select and move the groups from the **Available AD groups to join** to the **Selected AD groups to join** list.
5. 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:

- The name uses only the standard character set for Computer Name, which includes letters, numbers, and the following symbols: ! @ # \$ % ^ & ' ) ( . - \_ { } ~
  - Then name cannot be longer than 15 characters.
6. If you are provisioning non-persistent desktops, select the **When virtual machine is permanently deleted, also remove it from the domain** to instruct the Connection Broker to delete the Computer record from your Active Directory server. If you do not select this option, the Computer record remains in AD after the VM is deleted.




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.

# Chapter 6: Offering VHI Desktops to Users

## Defining Pool-Based Plans

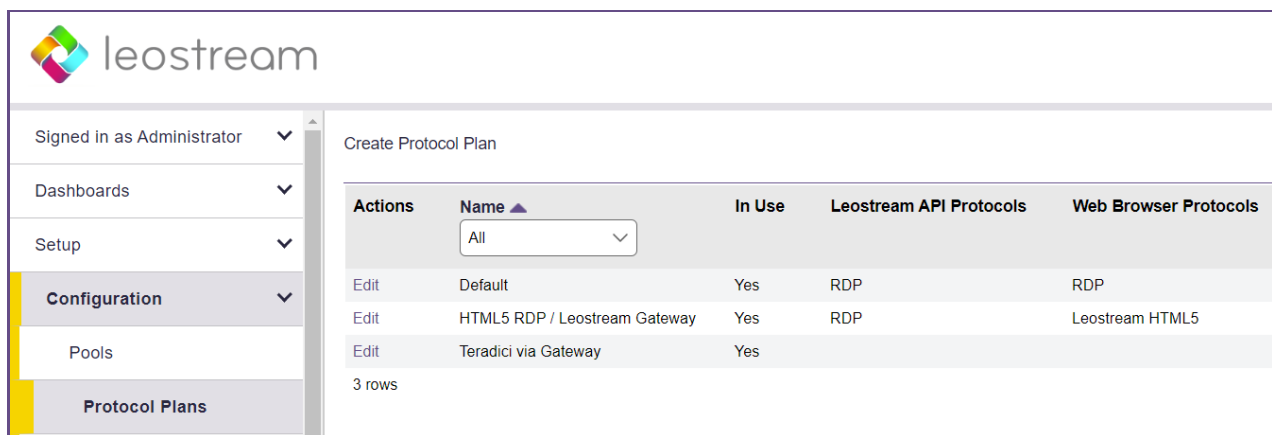
After you separate your desktops into pools, define the rules that control how the Connection Broker manages the user's connection to the desktops in those pools. To perform this step, ask yourself the following questions.

- 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?

 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.

## 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.



Actions	Name	In Use	Leostream API Protocols	Web Browser Protocols
Edit	Default	Yes	RDP	RDP
Edit	HTML5 RDP / Leostream Gateway	Yes	RDP	Leostream HTML5
Edit	Teradici via Gateway	Yes		

3 rows

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.

Signed in as Administrator

Dashboards

Setup

Configuration

Pools

Protocol Plans

Power Control Plans

Release Plans

Printer Plans

Registry Plans

Policies

Locations

### Edit Protocol Plan

Plan name  
Default

Leostream Connect and Thin Clients Writing to Leostream API

RDP Priority: 1

Command line parameters

Configuration file

```
screen mode id:i:2
desktopwidth:i:1024
desktopheight:i:768
session.bpp:i:32
```

Gateway


Select ...

Select ...

Leostream Gateway

Leostream Gateway in AWS

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.

 *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 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](#).

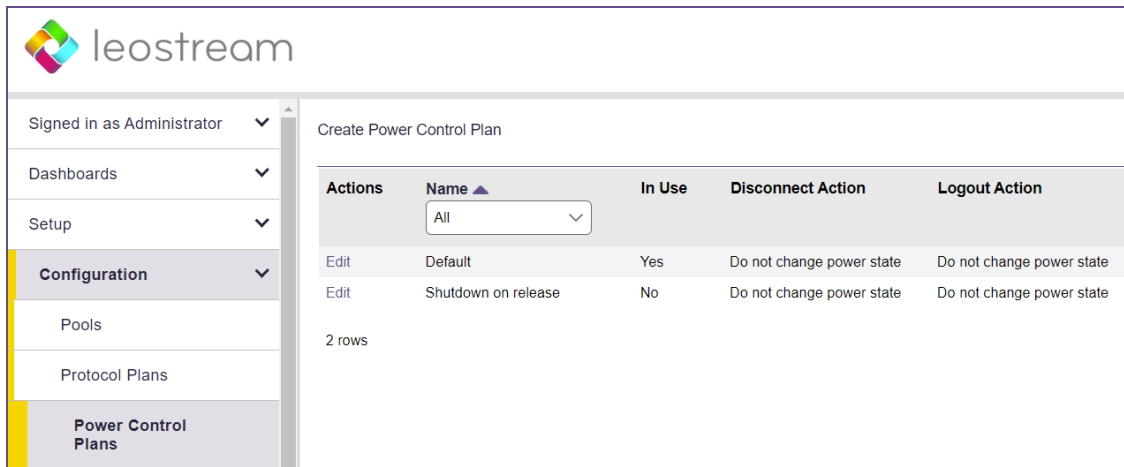
## Power Control Plans

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

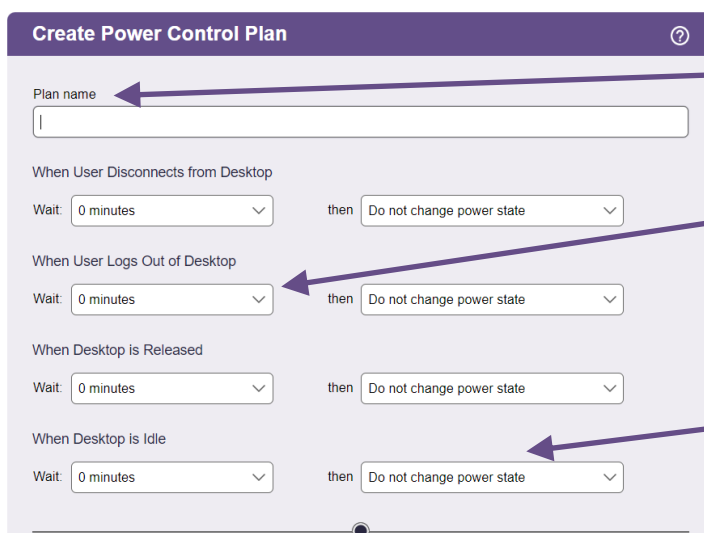
 *The remote desktop must have an installed and running Leostream Agent to allow the Connection Broker to distinguish between user logout and disconnect and to perform actions based on idle time.*

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.



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:

1. 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.



Enter a descriptive name. You'll refer to this name when assigning the plan to a pool.


Select the amount of time to wait before changing the desktop's power state. A wait time of zero tells the Connection Broker to immediately execute the selected power control action.

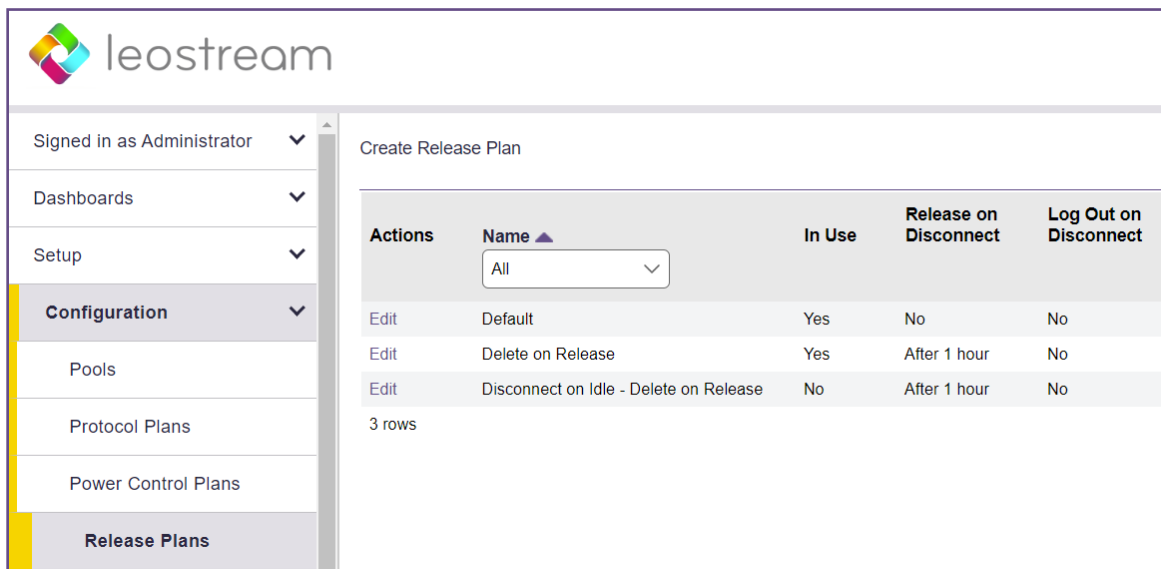
Select the power control action to take after the wait time elapses. For the Connection Broker to take actions based on disconnect or idle-time events, you must install the Leostream Agent on that desktop.

2. Enter a unique name for the plan in the **Plan name** edit field.
3. For each of the remaining sections:
  - a. From the **Wait** drop-down menu, select the time to wait before applying the power action.
  - b. 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.
4. Click **Save** to store the changes or **Cancel** to return to the **> Configuration > Power Control Plans** page without creating the plan.

## 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.

 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.



Actions	Name	In Use	Release on Disconnect	Log Out on Disconnect
Edit	Default	Yes	No	No
Edit	Delete on Release	Yes	After 1 hour	No
Edit	Disconnect on Idle - Delete on Release	No	After 1 hour	No

3 rows

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**

Plan name:

When User Disconnects from Desktop

Release to pool:

Log user out:

URL to call:

When User Logs Out of Desktop

Release to pool:

URL to call:

When Connection is Closed

Execute actions for:

This section of the plan executes when no Leostream Agent is installed or communicating on the remote desktop

When Desktop is Idle

Lock desktop:

Disconnect:

Log user out:

When Desktop is First Assigned

Release to pool:

Release if user does not log in:

"When Desktop is Released" actions will not be invoked

When Desktop is Released

☐ Log user out of the desktop

Delete virtual machine from disk:

Enter a descriptive name for the plan. You'll refer to this name when selecting the plan in policies.

This section controls actions taken when the user disconnects, but remains logged into, their remote desktop.

To model Persistent desktops, set all "Release to pool" options to "No". The Connection Broker offers an assigned desktop only to its assigned user.

If the Leostream Agent is not installed on the remote desktop, the Connection Broker cannot distinguish a disconnect from a logout event. For these cases, configure how to interpret the Client Close event that is sent by Leostream Connect.

Idle-time is accumulated when there are no mouse or keyboard events. When performing logout actions, you can also monitor the CPU level to delay the logout.

Use this section to schedule a release action based on the time of day or at an allotted time after assignment

To avoid "rogue" users, forcefully log out the user 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 VHI 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](#).

## Building User Policies

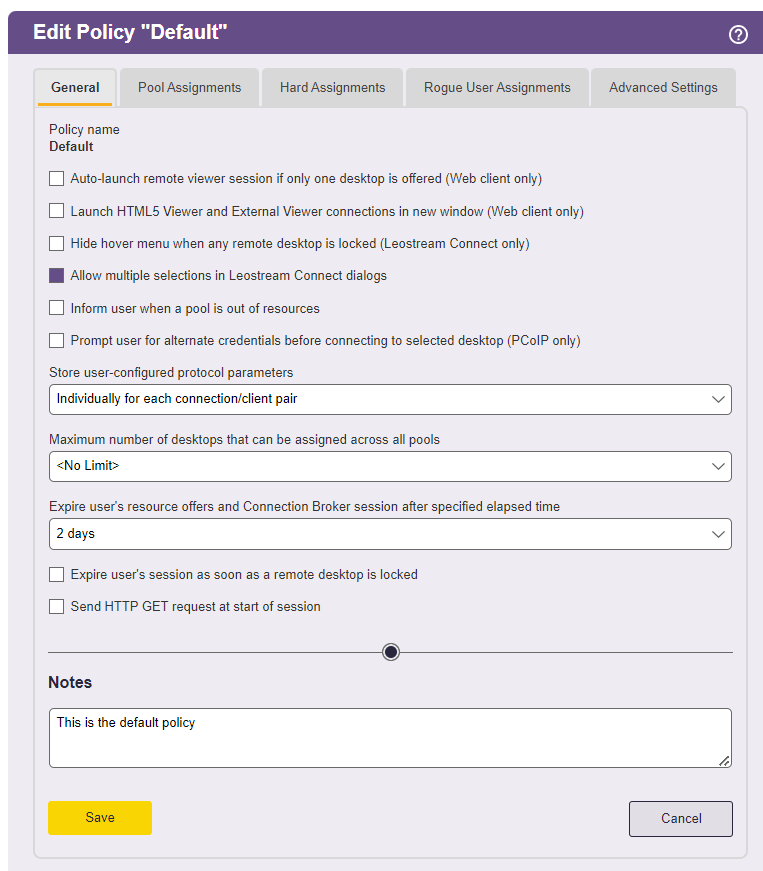
After you define pools and plans, build policies.

 *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.



**Edit Policy "Default"**

General | Pool Assignments | Hard Assignments | Rogue User Assignments | Advanced Settings

Policy name  
Default

☐ Auto-launch remote viewer session if only one desktop is offered (Web client only)

☐ Launch HTML5 Viewer and External Viewer connections in new window (Web client only)

☐ Hide hover menu when any remote desktop is locked (Leostream Connect only)

☒ Allow multiple selections in Leostream Connect dialogs

☐ Inform user when a pool is out of resources

☐ Prompt user for alternate credentials before connecting to selected desktop (PCoIP only)

Store user-configured protocol parameters

Individually for each connection/client pair

Maximum number of desktops that can be assigned across all pools

<No Limit>

Expire user's resource offers and Connection Broker session after specified elapsed time

2 days

☐ Expire user's session as soon as a remote desktop is locked

☐ Send HTTP GET request at start of session

Notes

This is the default policy

Save Cancel

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

**Edit Policy "Default"**

General **Pool Assignments** Hard Assignments Rogue User Assignments Advanced Settings

Add 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 in Chapter 5. 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](#).

## 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.



### Edit Assignments for Authentication Server "Leostream"

Domain name  
leostream.net

---

#### Assigning User Role and Policy

In this section, you can set up rules to assign Users to Roles and Policies based on their group membership. Optionally, use the Order column to re-order the rows.

Order	Group	Client Location	MFA Provider	User Role	User Policy
1	[any group]	Leostream	<Not required>	User	GPU Workstations
2		All	<Not required>	User	Default
3		All	<Not required>	User	Default
4		All	<Not required>	User	Default

[Add rows]

Default MFA Provider  
<Not required>

Default Role  
User

Default Policy  
Default

Users will be assigned the default role and policy if they don't match an assignment rule

☐ Assign policies using explicit LDAP expressions (This cannot be undone without removing all assignment rules)

You must save this form for this setting to take effect

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



*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.

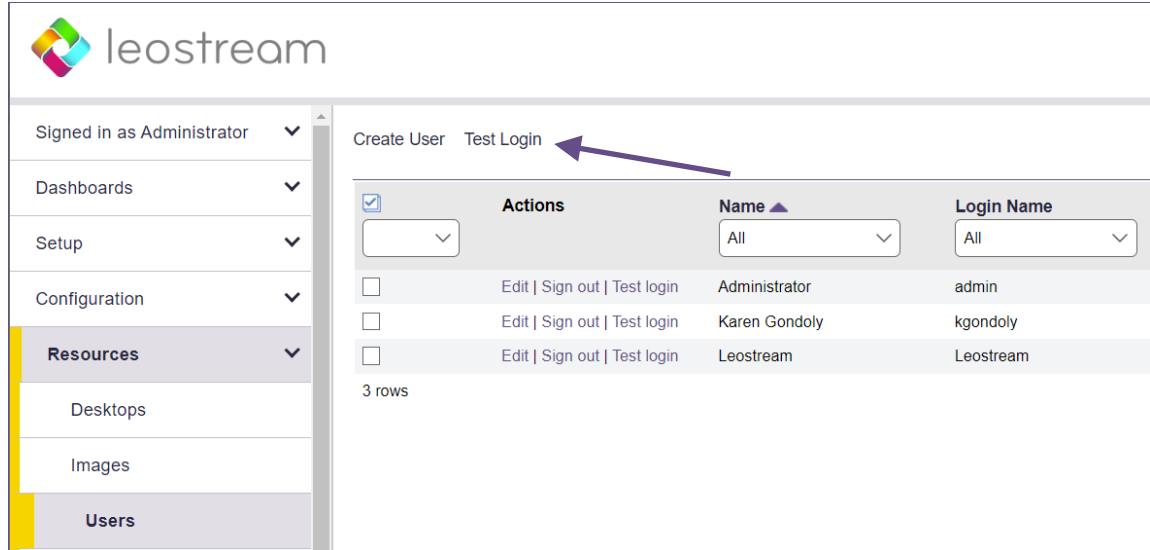
If you editing the Default policy, you can leave your Assignments table at its default values and proceed with the example.

## Testing Your 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.

 *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.*

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.



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:

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### Test Results

User name: Maybel  
Authentication server: Leostream  
Domain: leostream.net  
Client: Chrome/91.0 (Web Browser) at 10.110.3.40  
(This client is in these locations: Web browsers, All)

Looking up user "Maybel":  
in authentication server "Leostream" ← **found user** ([show Active Directory attributes](#))

Trying to match with Authentication Server Assignment rules: ([edit](#))

- 1: "memberOf" exactly matches "CN=Karen Test Sub Group,OU=Karen Test,OU=Karen Groups,DC=leostream,DC=net", location "All" ← no attribute match
- 2: "memberOf" exactly matches "CN=Students,OU=Security Groups,DC=leostream,DC=net", location "All" ← **matched**

**User will have Role "User" and Policy "Default"**

User must first successfully authenticate with RADIUS server "Okta RADIUS Agent" ← **PIN+token not provided**

User's role provides access to Web Client, only.

**Policy: Default** ([edit](#))

No hard-assigned desktops found

**Pool "All Desktops"** ([edit](#))

Including pool for all users

Looking for two desktops

Policy settings for this pool:

- follow-me mode
- do not allow users to change power state of offered desktops
- offer powered-on desktops without a running Leostream Agent
- do not offer stopped/suspended desktops
- favor previously-assigned desktops
- may offer desktops with pending reboot job
- do not confirm desktop power state
- do not power on stopped desktops
- do not log out rogue users
- do not attempt single sign-on into desktop console session
- allow manual release (but Maybel's role prevents it)
- Power control plan: Default
  - when user disconnects, do not change power state
  - when user logs out, do not change power state
  - when desktop is released, do not change power state
  - when desktop is idle, do not change power state
- Release plan: Default
  - handle unverified user state as disconnect
  - do not release on disconnect
  - do not log user out on disconnect
  - when user logs out, release immediately
  - do not lock desktop if idle
  - do not disconnect user if desktop is idle
  - do not log user out if desktop is idle
  - do not release after initial assignment
  - if user does not log in, release

(389 total, 383 in service, 18 policy filtered, 18 pool filtered, 18 available, 8 running, 8 with an IP address)

kdg-debian9 ← **available**, 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 ← **available**, 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 desktops with this policy.

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



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

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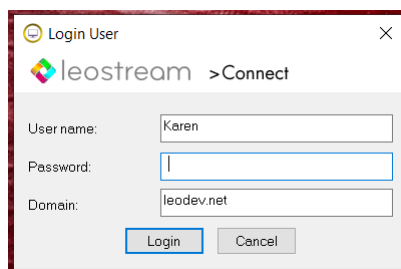
## Connecting to a Virtual Desktop Using Leostream

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.

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

A screenshot of the 'Login User' dialog box in the Leostream Connect client. The dialog has a title bar with a close button. Below the title bar is the Leostream logo and the text '>Connect'. There are three input fields: 'User name:' with the text 'Karen', 'Password:' which is empty, and 'Domain:' with the text 'leodev.net'. At the bottom are two buttons: 'Login' and 'Cancel'.

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

