



# Transform Any x86-64 PC and Laptop Into a Secure, Centrally Managed Endpoint

VMware Horizon Client  
Quick Start Guide (v1.0)



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## ABOUT THE PRODUCT:

NComputing LEAF OS is a next-generation software endpoint solution that transforms any x86-64 PC or laptop into a secure and centrally managed endpoint.

Designed and optimized for **VMware Horizon**, **Citrix DaaS**, **Citrix Virtual Apps and Desktops**, **Microsoft Azure Virtual Desktop (AVD)**, **Microsoft Windows 365 Cloud PC**, **Microsoft Remote Desktop Services (RDS)**, **vSpace Pro Enterprise**, **VERDE VDI and Remote Access**, LEAF OS delivers a secure computing environment to access virtual desktops and virtual apps from any x86-64 system. It can be used as a self-contained operating system when booted from a USB drive. This method leaves the user's existing operating system, files, and hard drive untouched while providing an ideal environment for work-from-home use cases. When users finish their work, a simple reboot to their native OS restores their device to personal use.

Alternatively, LEAF OS can be used to repurpose PCs, laptops and old thin clients by converting any x86-64 hardware from a stand-alone computer to a dedicated thin client by installing directly onto an internal hard drive, removing the old system and files. This method extends the usefulness of aging computers using end-of-life operating systems like Windows 7 while giving users powerful up-to-date desktops.

With integrated local **Chromium browser**, LEAF OS provides additional flexibility such as web kiosk mode or productivity mode with direct access to web contents and web apps without desktop virtualization. Other popular applications, such as local **Microsoft Teams** and **Zoom**, are available too.

LEAF OS devices can be remotely managed by the IT admin via PMC Endpoint Manager. LEAF OS devices provide a simple to deploy, centrally managed, high performance virtual desktop, designed and optimized for Virtual Desktop Infrastructures of organizations of any size.

Features highlights:

- Premium performance and native multi-display
- [VMware Horizon](#), [Citrix Virtual Apps and Desktops](#), [Microsoft Azure Virtual Desktop](#), [Microsoft Windows 365 Cloud PC](#), [Microsoft Remote Desktop Service](#), [VERDE VDI & Remote Access](#), and [vSpace Pro Enterprise](#) desktop virtualization support
- Integrated local Chromium browser, Microsoft Teams and Zoom applications provide additional flexibility for direct access to unified communication, web content/web apps without desktop virtualization
- Broad USB peripheral support
- Manageability with the [PMC Endpoint Manager](#) software
- Flexible deployment through Gigabit Ethernet or Wi-Fi support

## ABOUT NCOMPUTING'S LEAF OS SOFTWARE ENDPOINT SUPPORT FOR VMWARE HORIZON

The LEAF OS software endpoint solution is 'VMware Ready Certified' for End-User Computing.

VMware Horizon Client for Linux (version 2303) is integrated in LEAF OS 4.11.2 software endpoints.

Supported VMware Horizon environments:

- VMware Horizon Cloud
- VMware Horizon 8 version 2006 and later
- VMware Horizon 7 version 7.13 and later

Supported NComputing PMC Endpoint Manager versions:

- PMC 3.0 or newer versions

Supported peripheral device classes:

- Native (functional) redirection:
  - Mass storage
  - HDMI, DisplayPort, USB, and analog audio
  - USB and network printers
  - Webcams
  - Smart card readers and security keys
  - Serial ports
- Generic USB redirection for other USB devices

Additionally, the LEAF OS software endpoints have the following features:

- Native dual display support with independent screen rotation
- Local applications:
  - Chromium browser
  - Microsoft Teams
  - Zoom
  - Custom applications (deployed from a package or defined as a system application)
- Support for LEAF OS extension modules

## STEP 1 - INSTALL LEAF OS SOFTWARE ENDPOINT

**Note:** Skip this step if you are using [NComputing EX500 thin client](#).

### Download and prepare LEAF OS installation

1. From NComputing Software Download page, select “LEAF OS” and download the compressed image (i.e. ZIP).
2. Extract the .IMG file (~2GB) from the downloaded .ZIP file.
3. Create a bootable LEAF OS installer USB memory stick (use at least 4GB or higher capability):
  - a. Use a flashing application like the [Win32 Disk Imager](#) or [balenaEtcher](#) to write the image into your USB stick.
4. Pick an x86-64 PC/laptop (BIOS or UEFI).
  - a. Access the PC/laptop’s [Boot Menu](#) or change the PC/laptop BIOS setting to set external USB storage device at the top of the booting priority list.

### Use case #1 - live boot LEAF OS using USB memory stick

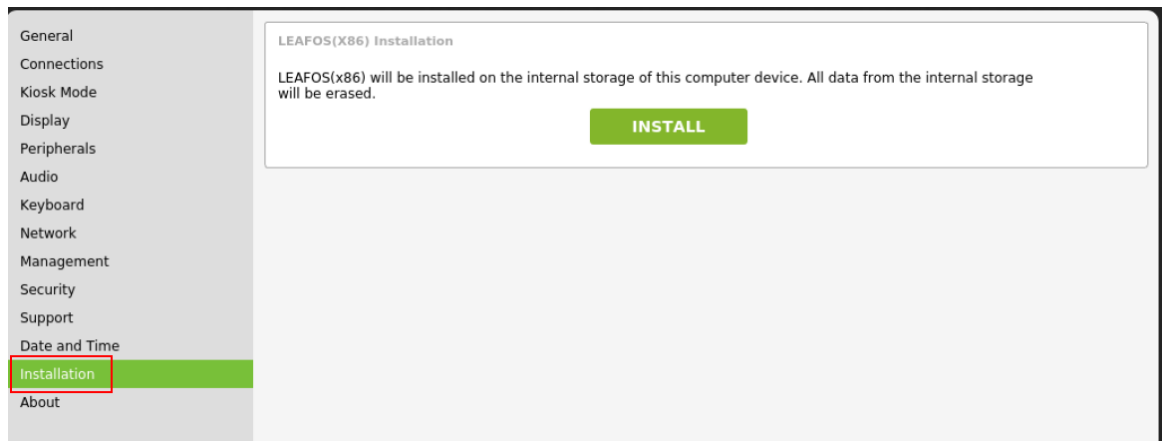
By default, your device will always live boot LEAF OS from the connected USB flash drive. There will be no changes to the PC/laptop’s internal HDD.

1. Connect the x86-64 PC/laptop to Ethernet or enable the Wi-Fi interface after booting up LEAF OS to connect to a wireless network.
2. Connect the bootable USB memory stick (prepared according to the instructions above) to the PC or laptop and power it up. The PC or laptop will perform live boot from the connected LEAF OS memory stick. Please refer to ‘[LEAF OS Live Boot from USB flash Drive Guide](#)’ document on how to perform USB live boot of LEAF OS on PCs/laptops across different manufacturers.
3. It may take 10-20 seconds to bring up the LEAF OS UI (similar to RX420(RDP) thin client) during the power up. Please be patient.
4. Once the LEAF OS UI is up, you will see the LEAF OS device activation window. Please move to step 2 below to activate the device.

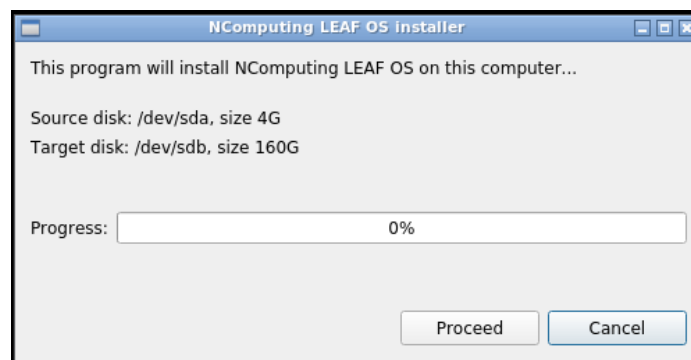
## Use case #2 - flash LEAF OS into HDD/SSD/eMMC/NVMe internal storage to boot from

**Note:** Your device's internal storage will be wiped out and flashed with LEAF OS. When you boot the device, the LEAF OS will be directly booted from the internal HDD/SSD/eMMC/NVMe storage.

1. Follow the procedure described as use case #1 above to live boot LEAF OS on the device using the connected USB memory stick.
2. Once the LEAF OS UI is up, open the Start Menu, click the gearwheel icon to open the LEAF OS Settings, navigate to the **Installation** tab and click the **[Install]** button. There are additional warning messages to inform the admin/user that the installation process will erase the selected internal storage device.



3. Once you click on **Install** and click **OK** on the warning message, wait a few seconds until the NComputing LEAF OS Installer window appears. It will prompt you to confirm to proceed flashing LEAF OS to the internal storage. Click the **[Proceed]** button to confirm and proceed.



The installation process may take several minutes. Please wait until it is finished. Once the internal HDD/SSD/eMMC/NVMe storage is flashed, you will be prompted to shut the PC/laptop down and reboot.

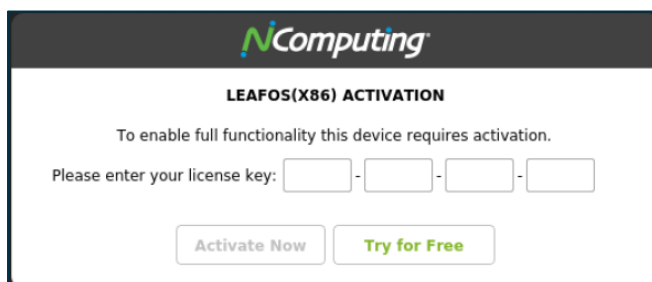
4. Remove the USB stick with LEAF OS installer and power up the computer again. LEAF OS will boot directly from the internal storage. Once the LEAF OS UI is up, you will see the LEAF OS device activation window. Please move to step 2 below to activate the device.

## STEP 2 - ACTIVATE LEAF OS SOFTWARE ENDPOINT

1. Once the LEAF OS device is booted up, you will see the device activation window.

If you already have a valid LEAF OS license key, enter it and click the **[Activate Now]** button. LEAF OS activation is a one time action.

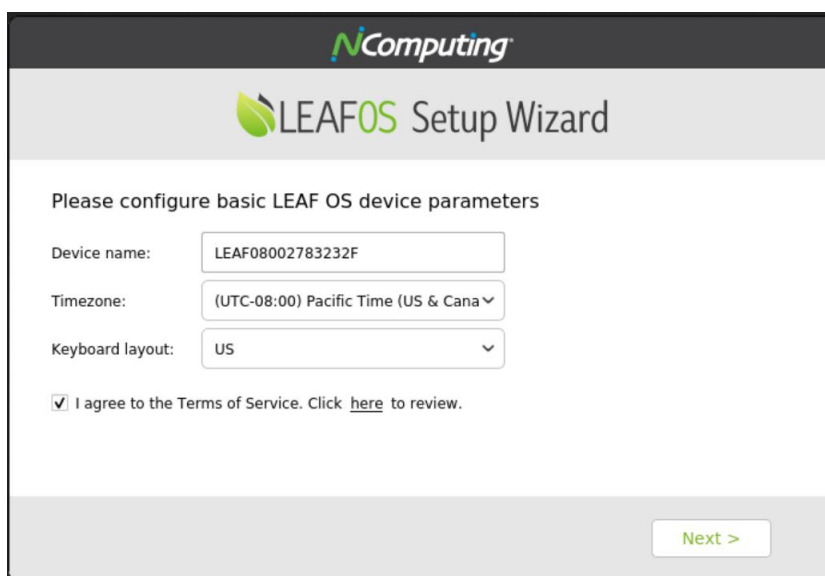
If you don't have a LEAF OS license, click the **[Try for Free]** button to start the free trial. The free trial duration is subject to change. At the time of this writing, LEAF OS free trial is 7 days on 3<sup>rd</sup> party hardware. Please contact NComputing if you need a longer trial period.



2. The device should be activated within seconds. Once the device is activated, you can configure the device to start working in your desktop virtualization environments.

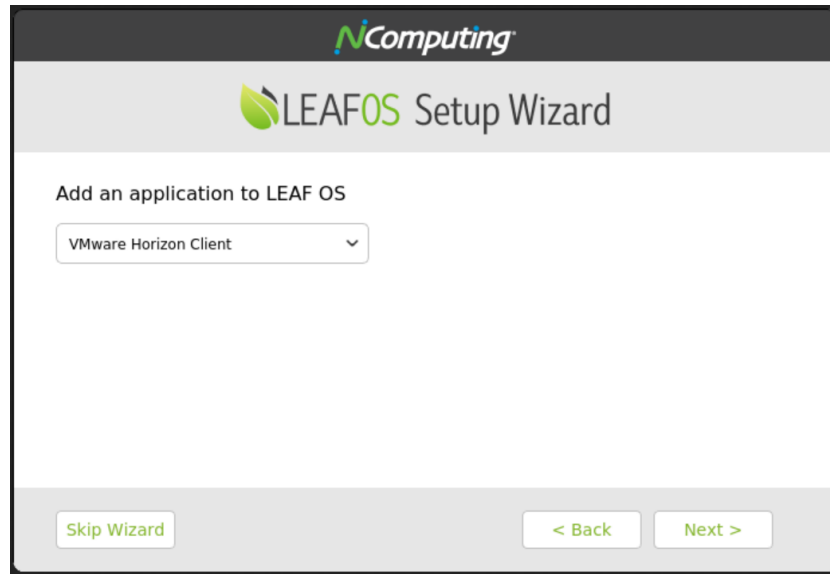
### STEP 3 - THE LEAF OS SETUP WIZARD

When LEAF OS is booted for the first time on a new device, the LEAF OS Setup Wizard will appear. The Setup Wizard allows quick and easy configuration of basic LEAF OS parameters.



When the option to use the PMC Endpoint Manager will be selected in the second step of Setup Wizard, then the VMware Horizon Client application configuration can be sent by PMC or it can be later added locally as described in the next sections of this guide.

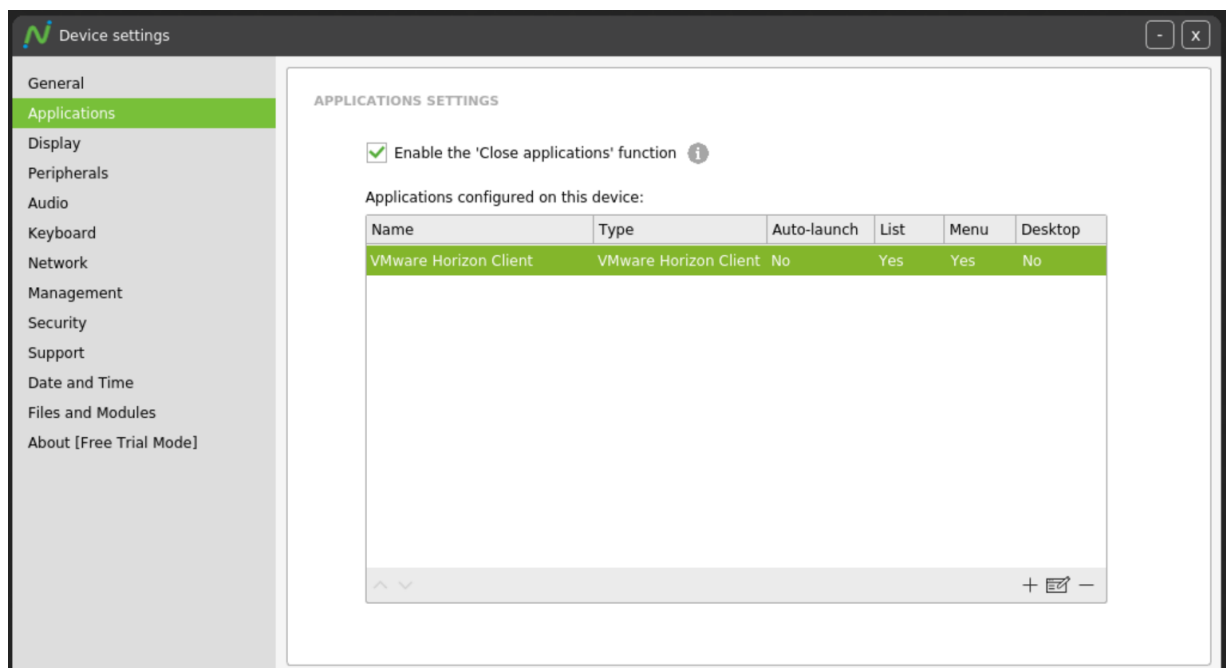
When the option to configure the device locally will be selected in the second step of LEAF OS Setup Wizard, then the VMware Horizon Client application can be selected as the application which the Wizard will immediately add to LEAF OS.



Please read the next sections of this guide to find the information about the configuration of the VMware Horizon Client application.

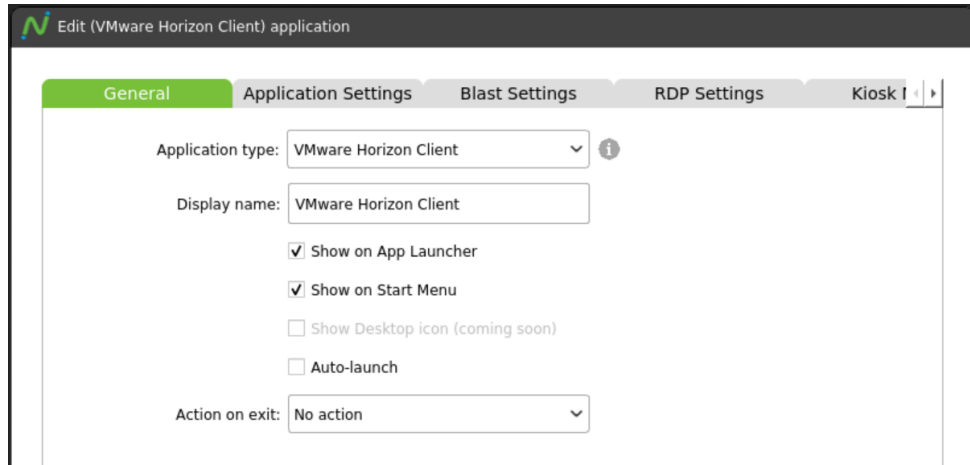
#### STEP 4 - ADD THE VMWARE HORIZON CLIENT AFTER COMPLETING THE SETUP WIZARD

To configure the VMware Horizon Client application, open the Start Menu, click the gearwheel icon to open the LEAF OS device settings application, and go to **Applications** section. If the VMware Horizon Client has not been added to LEAF OS from the Setup Wizard, then the **[+]** button located on the bottom bar of the applications list can be used to add the application. If the VMware Horizon Client has been added from the Setup Wizard, it will already exist on the list and the edit button (✎) can be used to edit the application settings.



## STEP 5 - CONFIGURE VMWARE HORIZON CLIENT APPLICATION SETTINGS

The configuration of VMware Horizon Client application is split into five categories: General, Application Settings, Blast Settings, RDP Settings, Kiosk Mode.



The screenshot shows the 'Edit (VMware Horizon Client) application' window. The 'General' tab is selected, showing the following settings:

- Application type: VMware Horizon Client (dropdown menu)
- Display name: VMware Horizon Client (text field)
- ☒ Show on App Launcher
- ☒ Show on Start Menu
- ☐ Show Desktop icon (coming soon)
- ☐ Auto-launch
- Action on exit: No action (dropdown menu)

The **General** settings are common to all LEAF OS applications and have following meaning:

**Application type** - the type of LEAF OS application; in this case it is the VMware Horizon Client application.

**Display name** - the name of the application presented to the user in Start Menu, in LEAF OS application launcher, and/or on the LEAF OS desktop (this feature will be available in upcoming LEAF OS version). It will be set to 'VMware Horizon Client' when this field will be left empty for the VMware Horizon Client application type.

**Show on App Launcher** - determines whether the application name and icon will be presented in LEAF OS application launcher window. If no configured LEAF OS application will have this option selected, the LEAF OS application launcher window will not be displayed at all.

**Show on Start Menu** - determines whether the application name and icon will be presented in LEAF OS Start Menu.

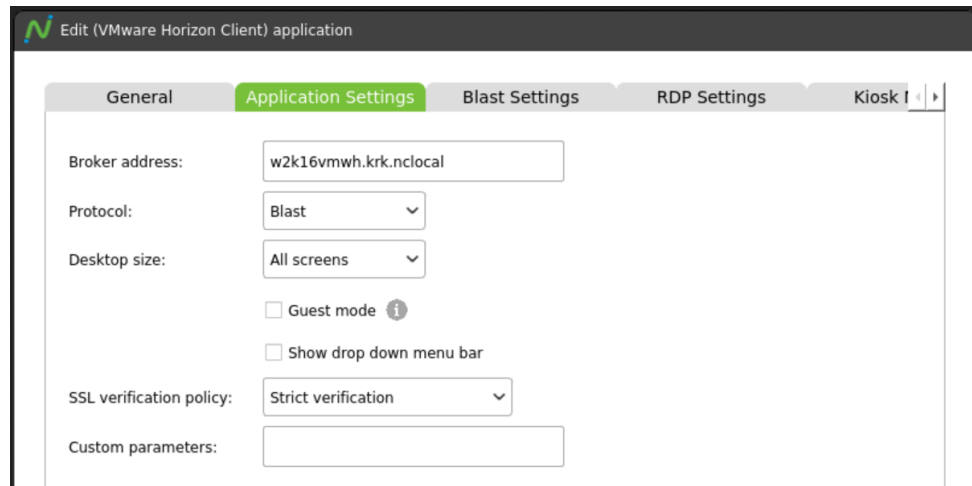
**Show Desktop icon** - determines whether the application name and icon will be presented on LEAF OS desktop. This feature will be made available in the next LEAF OS version.

**Auto-launch** - when enabled, the VMware Horizon Client application will be started automatically upon LEAF OS boot.

**Action on exit** - the selection of action which should be executed after closing the VMware Horizon Client application.

If the VMware Horizon Client application will be the only application used by the LEAF OS user, it's advisable to enable the **Auto-launch** option and to select **Restart** as the **Action on exit**.

Following VMware Horizon Client-specific **Application Settings** can be configured:



**Broker address** - the address of VMware Horizon server which will authenticate the users and provide list of available virtual desktops.

**Protocol** - the selection of the display protocol to be used for connections to virtual desktop machines. **Blast** and **RDP** protocol selections are possible. Further protocol-specific settings are available on dedicated tabs of the VMware Horizon Client application settings dialog. The PCoIP protocol is not available in the VMware Horizon Client integrated in LEAF OS.

**Desktop size** - screen configuration of the virtual desktop. The session can be started in full-screen mode on all connected monitors, in full-screen mode on a single monitor only, in big window, or in a small window.

**Guest mode** - when not enabled (which is the default), LEAF OS will preserve the configuration changes the user makes through the original VMware Horizon Client UI. When enabled, all the user-made configuration changes will be wiped out on LEAF OS reboot.

**Show drop down menu bar** - this setting controls the appearance of VMware Client's menu bar and connection bar.

**SSL verification policy** - selection of the checks performed on the SSL certificate presented by the VMware Horizon server:

- **Strict verification** - the SSL server certificate must be issued by a trusted Certification Authority, the Common Name in the Subject of the certificate must match the specified fully qualified domain name of the VMware Horizon server, and the certificate must be valid at the connection time. Connections will be disallowed in case of any SSL/TLS problems.
- **Warn and allow self-signed** - the connections to VMware Horizon servers presenting self-signed certificates will be allowed.
- **No checks** - no SSL certificate checks will be performed and connections to all servers will be allowed.

**Custom parameters** - a semicolon-separated list of custom parameters for the VMware Horizon Client. Custom parameters can be used to extend the command line of the VMware Horizon Client executable (of the 'vmware-view' program) or to modify some VMware Horizon Client's configuration files.

The syntax of each VMware custom parameter must be one of the following:

Destination:                vmware-view command line



Parameter syntax:     arg:cmdline\_parameter  
Example:               arg:--launchMinimized  
Example:               arg:+CRLRevocationCheck

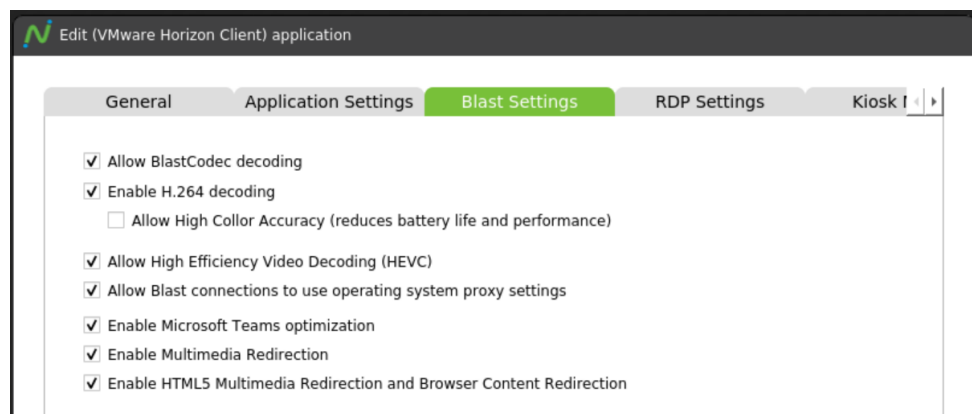
**Note:** the VMware Horizon Client application (the 'vmware-view' program) will be by default launched with the --skipCRLRevocationCheck command line parameter. This parameter lets the client to not perform the revocation checks of the SSL certificates. To enforce those checks, the 'arg:+CRLRevocationCheck' custom parameter must be used.

Destination:           /etc/vmware/config file  
Parameter syntax:     config:parameter\_name=parameter\_value  
Example:               config:RemoteDisplay.AllowAudio = "false"

Destination:           /etc/vmware/viewagent-custom.conf file  
Parameter syntax:     viewagent-custom.conf:parameter\_name=parameter\_value  
Example:               viewagent-custom.conf:BlastProxy.log.logLevel = 'verbose'

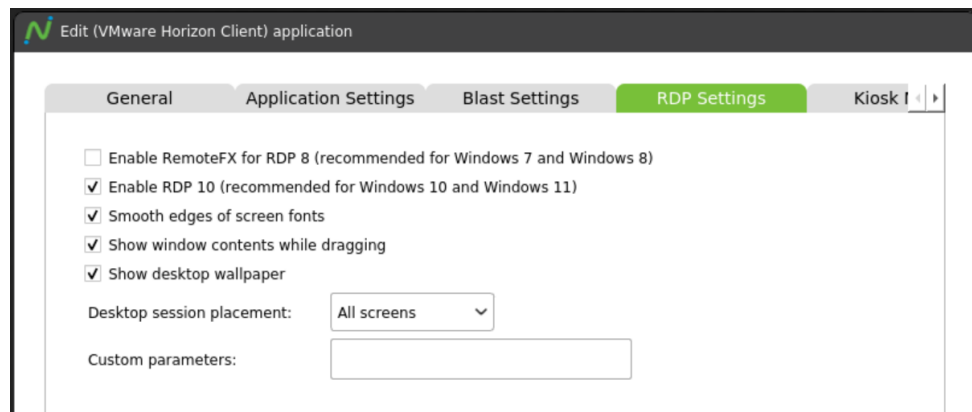
Destination:           \$HOME/.vmware/view-preferences file  
Parameter syntax:     view-preferences:parameter\_name=parameter\_value  
Example:               view-preferences:view.enableHEVC = 'FALSE'

Following Blast protocol settings can be configured for the VMware Horizon Client:



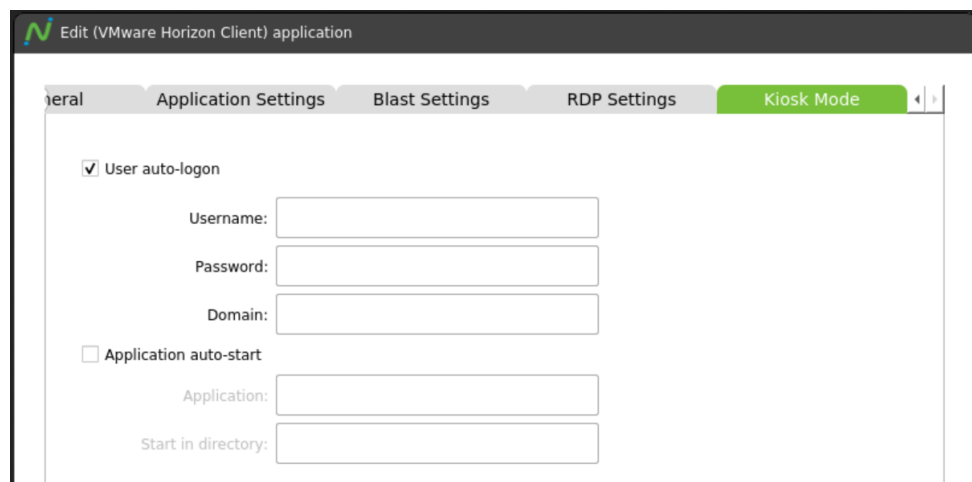
The Blast protocol settings configurable here are same as the ones which are configurable in the VMware Horizon Blast Configuration dialog, accessible from the **File > Configure VMware Blast** menu of the original VMware Client UI. Additionally, the Microsoft Teams optimization, multimedia, and web contents redirection settings are configurable under **Blast Settings**.

Following RDP protocol settings can be configured for the VMware Horizon Client:



When the **RDP** protocol is selected under **Application Settings**, then the FreeRDP client will be used by the VMware Horizon Client for making the virtual desktop connections. The settings configurable here correspond with the regular RDP Client application settings.

Following **Kiosk Mode** settings can be configured for the VMware Horizon Client:



**User auto-logon** - when selected, the specified credentials will be used to automatically log on to a VMware user.

**Application auto-start** - when enabled, the virtual desktop with the name specified in the **Application** field will be started automatically for the logging-in user.

**Note:** The **Application auto-start** feature only works in conjunction with the **User auto-logon**. This allows configuring kiosk setups, where the VMware Horizon Client auto-launch, user auto-logon, virtual desktop auto-start, and then the VMware Client restart function on previous instance exit will be executed one after the other.

## Keyboard layout mapping

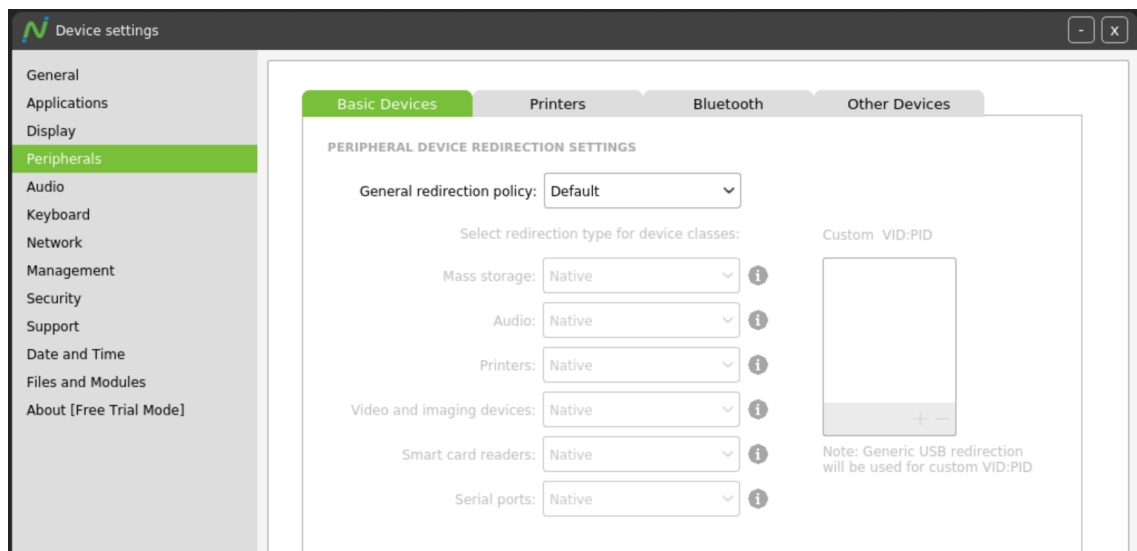
When the RDP protocol is selected under **Application Settings**, the VMware Horizon Client reports to the virtual desktop machine the information about the keyboard layout configured locally on the client device. When using the Blast protocol, the keyboard layout configured on the virtual desktop machine side will be used in the user session.

## Deploying Certification Authority certificates

VMware Horizon Client needs to trust the issuer of the SSL server certificate presented by the VMware Horizon server (accessible through the **Broker address** specified in **Application Settings**). If necessary (e.g. when using organization's own Certification Authority), to establish this necessary trust relationship, the certificates of Root and Intermediate Certification Authorities (X.509 certificates) can be added to LEAF OS devices under the **Security** settings. LEAF OS accepts Base64-encoded Certification Authority certificates. The Base64-encoded X.509 certificate format is commonly known as PEM format. Please refer to the 'Security Settings' section of 'LEAF OS and RX-series User and Configuration Guide' for more information (you will find the download link in the '[Additional Resources](#)' section below).

## STEP 6 (OPTIONAL) - CONFIGURE PERIPHERAL DEVICE REDIRECTIONS

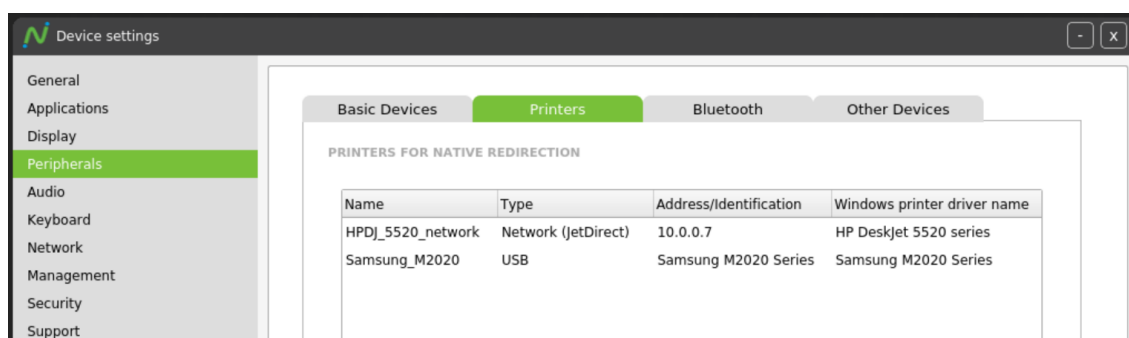
Navigate to LEAF OS **Settings > Peripherals** tab to configure the redirection of peripheral devices. The optimum redirection settings are already pre-selected for all supported classes of peripheral in the **Default** general redirection policy. The best behavior will be achieved when using the Native (functional) redirection. For VMware Horizon sessions, the Native redirection is available for mass storage devices, audio devices, printers, webcams, smart card readers, and serial ports (RDP only). Administrators can customize the settings and enable or disable redirection for selected classes of peripheral devices by selecting the **Custom** policy.



## Printers

VMware Horizon Client in LEAF OS supports the Native (functional) redirection of USB and network (JetDirect) printers. The native redirection of printers requires the printers to be defined locally on the LEAF OS device. When adding USB printers, a USB printer identification string needs to be pulled from the USB printer (if it is connected) or specified manually. This serves the purpose of identifying the different USB printers, when multiple USB printers will be connected. In case of single USB printer, this USB

identification field can be left empty. For each configured printer, the exact name of Windows printer driver must be specified.



For each defined printer, LEAF OS will create two printers: first - with the original name, and the second - with the original name and with the '\_local' suffix appended. For the first printer, LEAF OS will not configure any Linux printer driver (so this printer will only act as a spooler and will then send the spooled print jobs to the physical printer without reformatting them). This printer will be used in VDI connections using the RDP protocol. The specified **Windows printer driver name** will be reported to the virtual desktop VM when making connection with the RDP protocol. The virtual desktop VM must have this exact driver installed to be able to load it when creating the redirected printer. 'x64, Type 3 - User Mode' printer drivers are appropriate for the Native redirection of printers with the RDP protocol. For the second printer (the one with '\_local' suffix), LEAF OS tries to find and to load an appropriate Linux printer driver. This second printer will be used for the printers redirection with the Blast protocol. No dedicated Windows printer driver needs to be installed on the virtual desktop VM in this case. The print job received from the virtual desktop will be rendered on LEAF OS with the help of the Linux printer driver and only then sent to the physical printer.

### Smart cards readers

CCID-compliant, ACS, and Reiner SCT CyberJack smart card readers are supported and will be redirected with the Native method with both protocols (RDP and Blast).

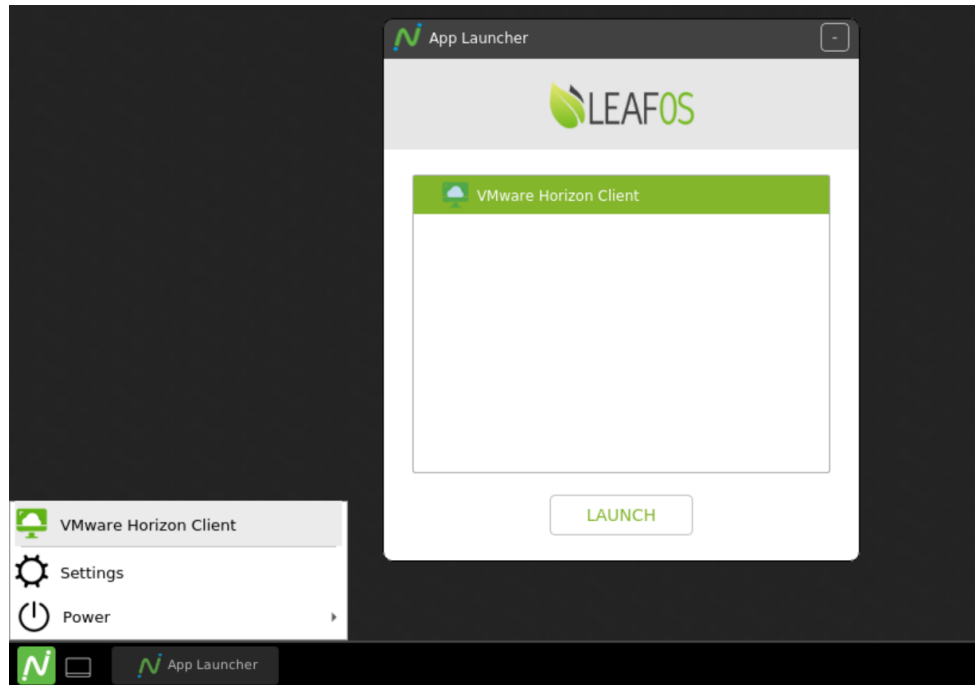
### Serial ports

Serial ports (USB-to-serial adapters) can be redirected with the Native redirection method when the RDP protocol will be selected. The /dev/ttyUSB0, /dev/ttyUSB1, /dev/ttyACM0 and /dev/ttyACM1 serial devices will be redirected as client's COM1, COM2, COM3 and COM4 ports, accordingly.

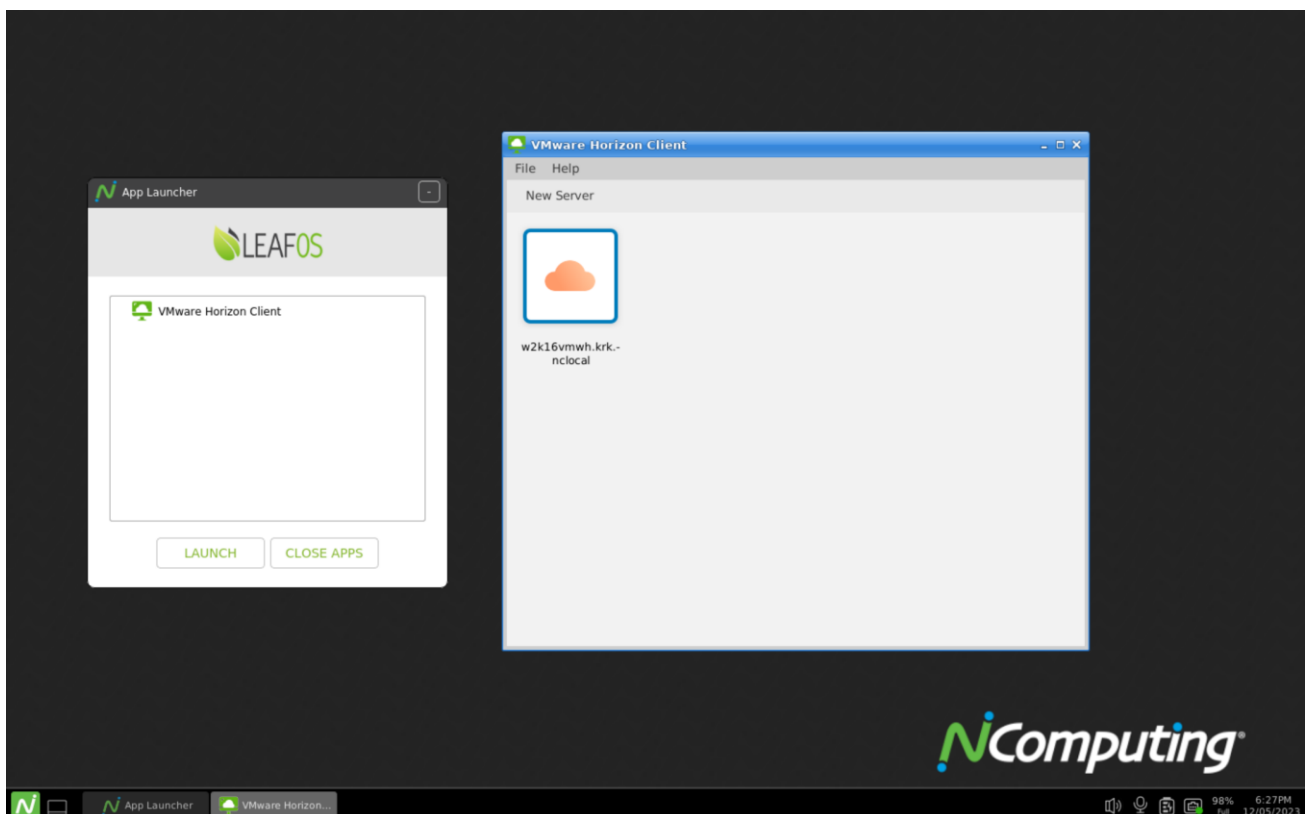
Serial ports can be redirected with the Generic USB redirection method when the Blast protocol will be selected. VMware's own Generic USB redirection implementation will be always used in this case, no matter what redirection method is selected for the Serial Ports in the **Peripherals** settings. Windows driver for the connected USB-to-serial adapter needs to be installed on the virtual desktop VM for the serial ports redirection to work in this case.

## STEP 7 - LOGIN TO VMWARE ACCOUNT

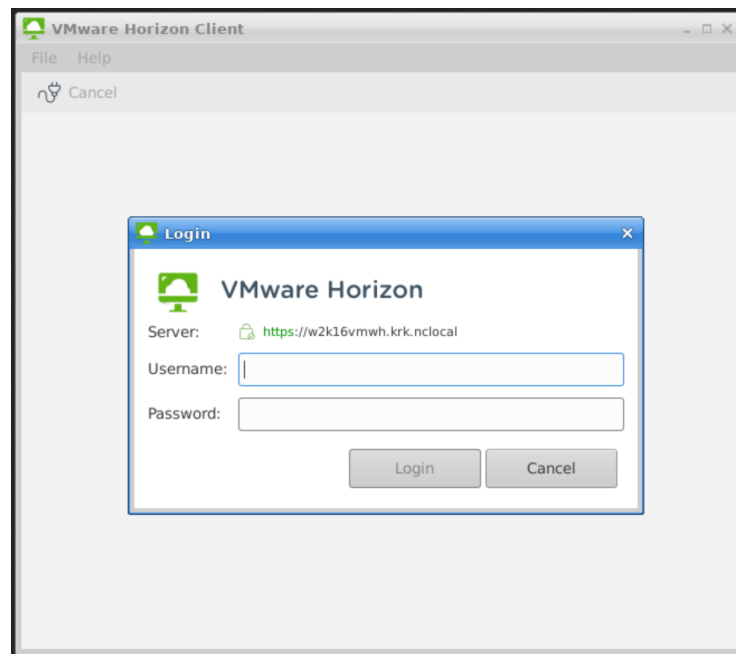
After configuring the necessary VMware Horizon Client settings, the configuration needs to be saved. Depending on the state of the auto-launch option, LEAF OS will start the client automatically or the user will need to start it manually from the Start Menu or through the LEAF OS App Launcher.



The VMware Horizon Client will already be configured with the VMware Horizon server (broker) address specified in client's configuration:



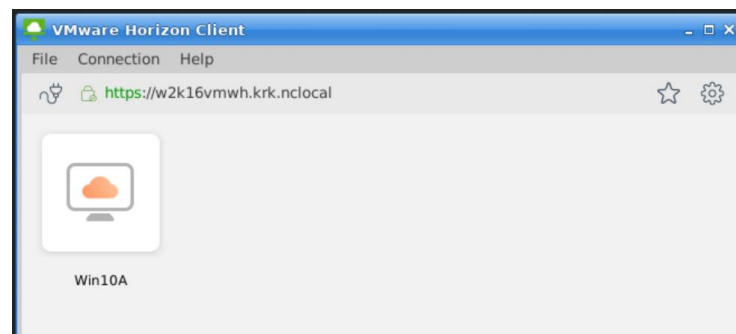
If user auto-logon has not been enabled in Kiosk Mode settings, after opening the connection to the VMware Horizon server, the user will be asked for authentication:



With user auto-logon enabled, the virtual desktops available for the user will be immediately presented.

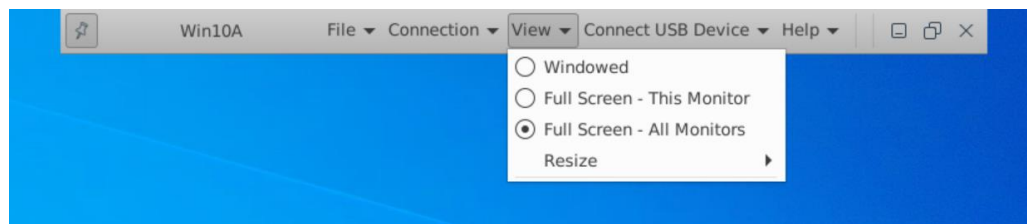
## STEP 8 - ACCESSING VMWARE VIRTUAL DESKTOPS

After successful authentication, the available VMware virtual desktops will be presented to the user. Users will have the ability to launch the desktops, add or remove them to/from favorites, configure desktop connection settings, and configure the Blast settings (if the drop down menu bar has been enabled).



Depending on the **Desktop size** selection, the virtual desktop sessions will be launched in full-screen or in windowed mode. The drop-down menu bar (if enabled) is the simplest way to switch between full-screen mode and window mode, to switch between the virtual desktops, or to switch between virtual desktop and

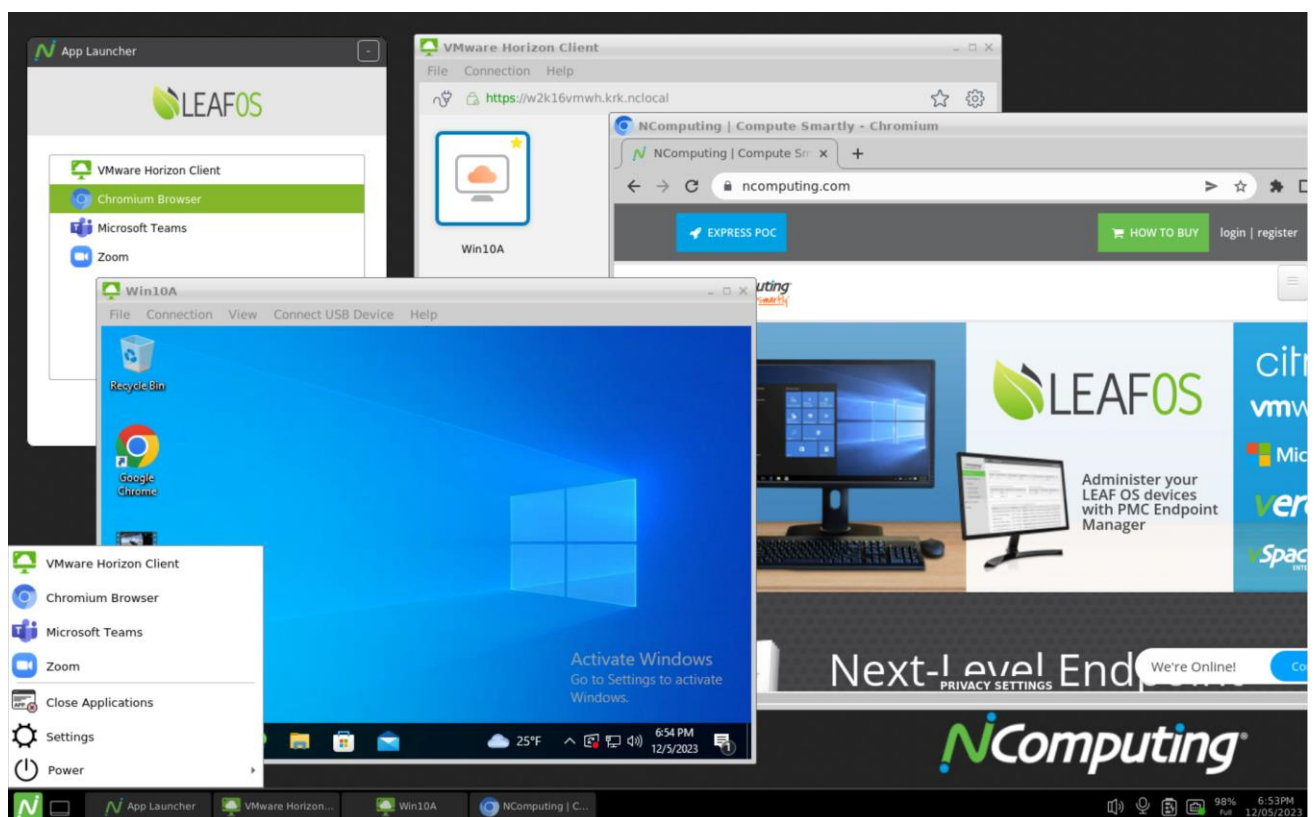
the local GUI. The menu bar also allows disconnecting the session, logging off the user, configuring connection settings (including Blast protocol settings), and connecting the USB peripheral devices.



## STEP 9 - ACCESS LOCAL APPLICATIONS IN PARALLEL WITH VMWARE VIRTUAL DEKSTOPS

LEAF OS software endpoint allows users to multi-task between VMware sessions and the built-in local Chromium, Microsoft Teams, Zoom, and other Linux applications. This allows direct access to unified communications (including video conferencing), web content and web apps without going through desktop virtualization. The local applications will be presented besides VMware Horizon Client in the Start Menu and/or in the LEAF OS App Launcher window.

Switching between all kinds of applications can be done by clicking the application shortcuts on the local taskbar or by using the Ctrl-Alt-Arrow Up/Down key-combination.



### LEAF OS software endpoint and RX420(RDP) User and Configuration Guide

LEAF OS and RX420(RDP) are easy-to-use and provision. For users who want to learn how to use advanced features and/or customizations, please refer to the LEAF OS and RX420(RDP) User and Configuration Guide:

<https://ncomputing.box.com/shared/static/310pp20tfhh4aqc6x4nj14sxch52q360.pdf>

### PMC Endpoint Manager Quick Start Guide

NComputing PMC is an endpoint management system designed and developed to remotely manage NComputing access devices.

Please refer to the PMC Quick Start Guide:

<https://support.ncomputing.com/portal/en/kb/articles/pmc-2-5-0-quick-start-guide>

Key features of PMC include:

- Ability to manage devices located in local- and wide-area networks, devices located behind firewalls and NAT-routers, including devices of work-from-home users.
- Ability to edit configuration of selected devices and to push configurations to multiple devices (through device profiles).
- Ability to securely shadow all managed devices' screens.
- Ability to request and collect troubleshooting information from managed devices.
- Ability to schedule device firmware updates.
- Readiness to support future device families, models, and configuration versions by uploading configuration definition files.
- Hosting files (firmware, certificates, wallpapers) for managed devices.
- Deployment as virtual appliance compatible with industry-standard hypervisors and Azure Cloud.
- Easy to use web-based user interface, accessible from any network location.
- Dashboard view with auto-refreshing summary information.
- Detailed event logging with filtering capability.
- Ability to export the contents of all PMC lists.
- Ability to mark selected devices as lost or found.
- Ability to revoke LEAF OS licenses.



## CONTACTING TECHNICAL SUPPORT AND ADDITIONAL RESOURCES

For Citrix related questions or feedback, please visit [NComputing knowledge base](#) or [NComputing support page](#).

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