lanOS

Overview

The benefits of Diskless computing

lanOS: An Introduction

Installing Windows is fairly straightforward and uneventful. You download the latest installer from Microsoft's website, you image it onto a USB drive and boot off of it. And for the majority of users, that's more than ideal. But what if your job title requires you to manage multiple – tens or even hundreds of systems?

Installing Windows more than a few times becomes very boring very quickly. But for the better part of this decade, tools have existed to simplify mass computer deployment, taking a single master image of all operating system files and to deploying it en masse to all systems, massively simplifying IT operations and requiring virtually zero input from the end user.

This scenario is perfect for a business setting, where employees have a personal dedicated computer for doing their work. Recent development in Virtual Desktop Infrastructure technology has enabled employees to work at home with ease, being able to access the same session they have in the office remotely, from any personal device.

But one sector has remained stagnant in progress. While computer imaging and VDI has helped shape modern computing in business environments, developments in public computing environments are virtually inexistent. Computers in public places such as schools, universities, public libraries, etc. are often riddled with malware and tend to fail from the stress of constant use in a public environment. And constantly swapping out dead hard drives and reimaging infected systems is far from efficient, and neither is investing in higher reliability solid state drives for such a large number of systems. What if there were a way to completely eliminate the hard drive from the systems, and ensure a clean Windows image on every boot?

Meet lanOS, a diskless, efficient and modern solution for public computing.

Why Diskless?

Reduce Cost and Increase Efficiency

Desktop deployment is time-consuming and costly. With lanOS, computers in public environments such as computer labs no longer need to be provisioned and managed individually. A single virtual disk can be assigned to multiple targets and computers will retain their identifying information such as SID or Directory Machine Password, so computers deployed using lanOS can be added to a domain and managed through traditional methods such as Microsoft System Center.

Eliminate Hard Drive Failure and Remove the Need for Complex Backup Solutions

Being diskless means that hard drive reliability for every system is no longer a cause for concern. Because Operating System and user files do not reside on the machine, the need for reliable storage hardware and expensive and complex backup solutions is decreased to only one server machine. In case of hardware failure, the virtual disk can be remapped to another target, without the need for reinstallation or migration of user data.

Secure Public Desktops

Computers in environments shared by many users are prone to configuration changes and are often the target for malware. Thanks to lanOS, machines can be configured to persist all changes to the computer drive, just like a regular computer system, or they can be configured so that all modifications to files, installed programs and registry keys are discarded at shutdown or reboot, effectively rendering the hard drive read-only.

Why lanOS?

Free and Open Source

No need to spend large amounts of money on proprietary, closed source solutions. lanOS leverages functionality built in to any Windows Server edition and uses the latest technology to deliver its powerful features. It is open to contributions from anyone willing to help extend its capabilities.

Simple and Reliable

Despite its simple Powershell script-based architecture, lanOS makes use of tested and reliable software in Windows Server. Any server machine running Windows Server 2016 or 2019 can be configured as a lanOS host.

Easy to Use and Manage

Built with simplicity in mind, lanOS is managed by a Windows Admin Center extension powered by modern web technologies such as Angular and HTML5. Its easy-to-use web interface means that there is no need to hire additional staff to manage lanOS. Everything is meticulously labeled and rigorously documented such that getting started with lanOS is as painless as possible.

The Technology Behind Diskless

At the heart of lanOS sits iSCSI. Designed as a protocol to enable SCSI commands to be sent through a conventional TCP/IP-based network, it is what allows operating system files to be accessed over a network, as if they were on a locally-attached hard drive. As for the actual booting process, PXE is what lanOS uses to allow physical machines to discover and attach their virtualized drives. As such, in technical detail the boot process with lanOS can be described like so:

1. The target machine's network card loads its PXE OPROM and sends a layer 2 broadcast frame requesting DHCP information.
2. The DCHP server responds to the query, sending back information such as what IP address the machine should use, PXE-related information such as the TFTP server and image that should be bootstrapped and lanOS-specific information such as details for the virtual iSCSI drive to mount.
3. The PXE OPROM acknowledges the DHCP offer, downloads and loads into memory then bootstraps the bootloader image, iPXE.
4. iPXE takes control over the boot process and mounts the iSCSI target and attempts to MBR-boot from it. The bootloader on the iSCSI image receives a special payload called the iSCSI Boot Firmware Table (iBFT) which details exactly how the operating system can take over the boot process and continue loading from the iSCSI drive.
5. Microsoft Boot Manager takes control and loads critical operating system components such as the kernel and critical drivers, which include drivers for the network card as network access is essential for iSCSI operation.
6. The boot process continues as normal and the virtual iSCSI target appears to the rest of the operating system as a regular physically attached drive. Any writes to the virtual drive can be redirected to RAM and discarded on shutdown.