

# Creating, Automating and Optimizing a Windows Image for Horizon

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# Agenda

Why Optimize Windows?

What to Optimize?

How to Optimize?

Building an Optimized Image

Running Windows Update

Using Automation

# Why Optimize?

Windows is not built for virtualization

A close-up photograph showing a person's hands interacting with a laptop screen. The hands are positioned as if performing a touch or tap operation. The laptop is open and placed on a wooden desk. In the background, another person's hands are visible, also interacting with a laptop screen. The overall scene suggests a fast and efficient login process.

“5 minute  
login down to  
40 seconds”

# Why Do We Need to Optimize?

## Windows

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Out of the box not designed for virtualization

- Lots of unnecessary services, features, processes, etc.

In a physical world not so much of an issue

- Even entry-level machines today are really powerful
- Multiple cores

## Benefits of Optimizing

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Increase consolidation ratio

Enhance guest OS responsiveness

Improve logon times

Better user experience

# Does Windows Really Use That Much for Background Tasks?

Some tasks can take up to a full core

- Not an issue on physical with many cores

Some tasks only run when machine is idle

- In VDI cores are shared
- If task consumes CPU it is never truly idle
- E.g.
  - Folder clean up
  - .NET Native Image Generator

Name	Status	Triggers	Next Run Time	Last Run Time
.NET Frame...	Ready		1/25/2019 2:40:23 PM	
Specify the conditions that, along with the trigger, determine whether the task should run. The task will not run if any condition is not met.				

Idle

Start the task only if the computer is idle for:  
Wait for idle for:  
10 minutes  
1 hour

Stop if the computer ceases to be idle  
 Restart if the idle state resumes

Name	Status	Triggers	Next Run Time	Last Run Time	Last Run Result
SilentCleanup	Ready		12/5/2017 3:03:08 PM		The operation completed successfully. (0x0)
Specify the conditions that, along with the trigger, determine whether the task should run. The task will not run if any condition is not met.					

Idle

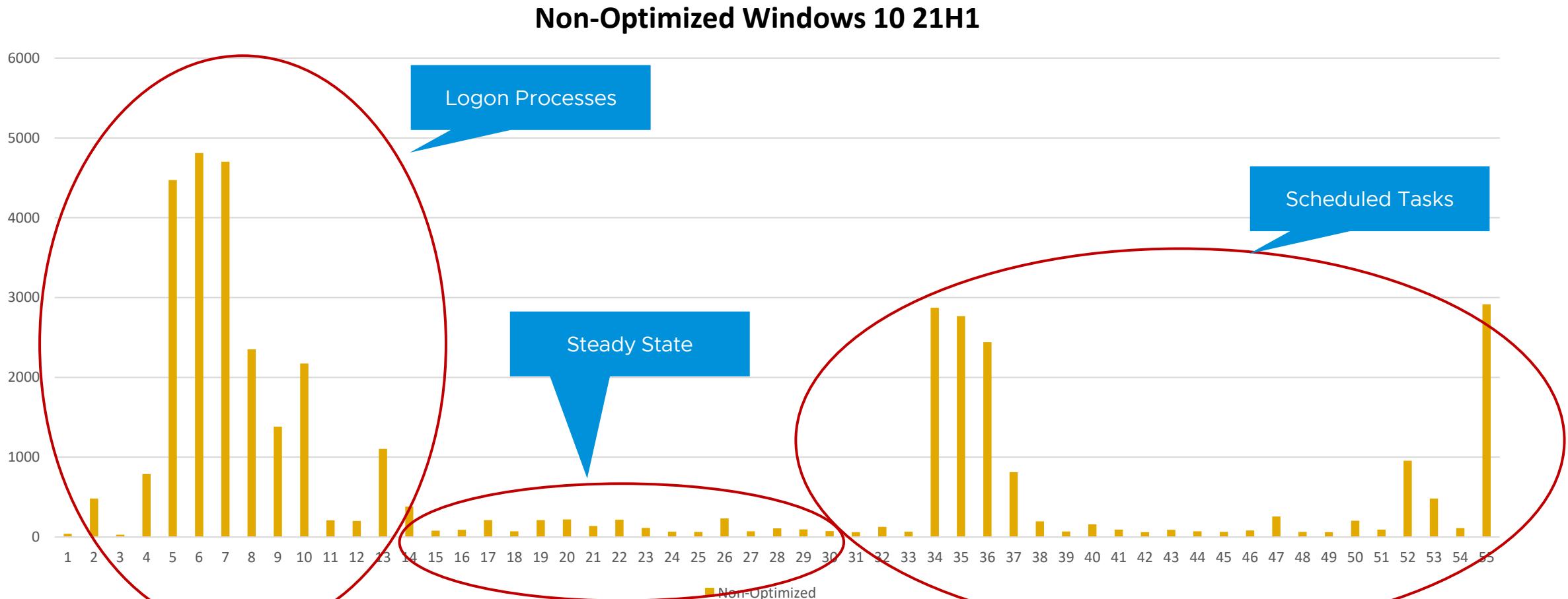
Start the task only if the computer is idle for:  
Wait for idle for:  
10 minutes  
1 hour

Stop if the computer ceases to be idle  
 Restart if the idle state resumes

# Unoptimized Windows CPU Usage

Windows 10 21H1 Enterprise – logon and then idle

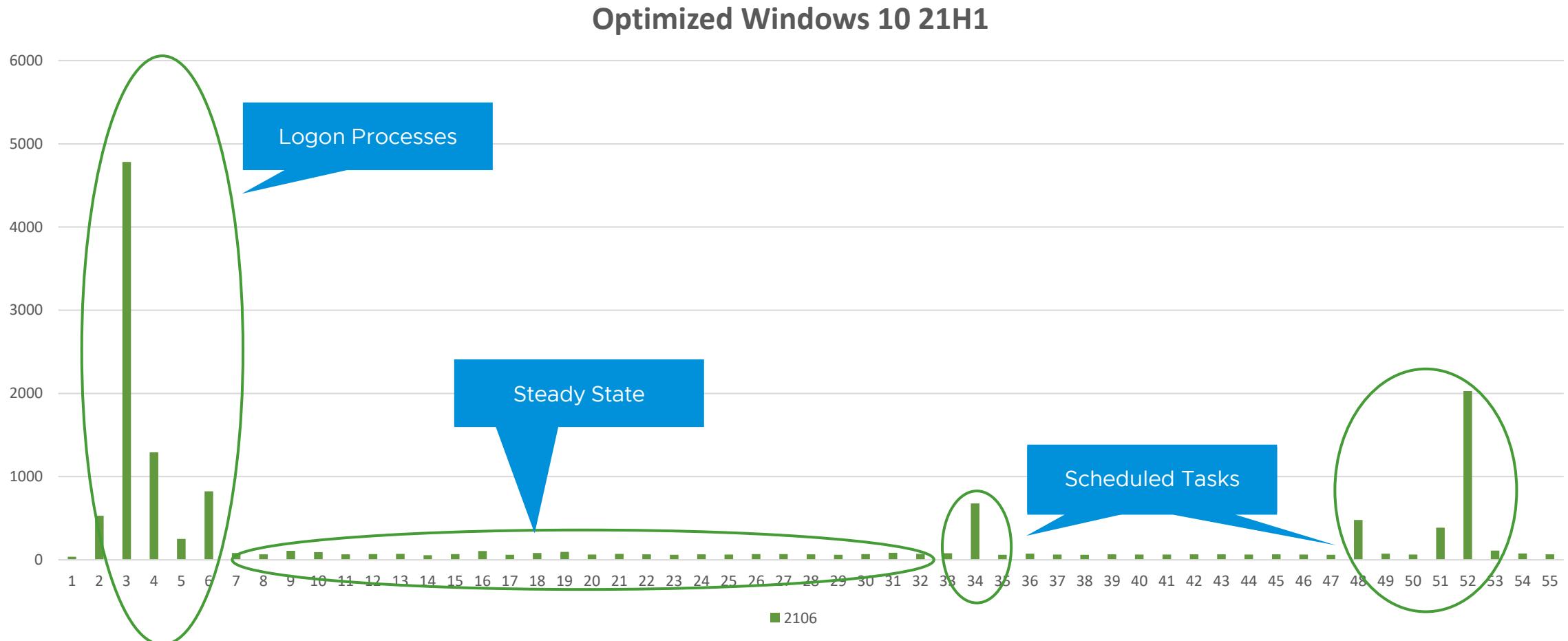
Unoptimized



# OSOT Optimized Windows CPU Usage

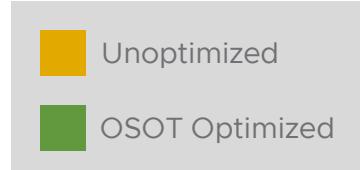
Windows 10 21H1 Enterprise - logon and then idle

OSOT Optimized

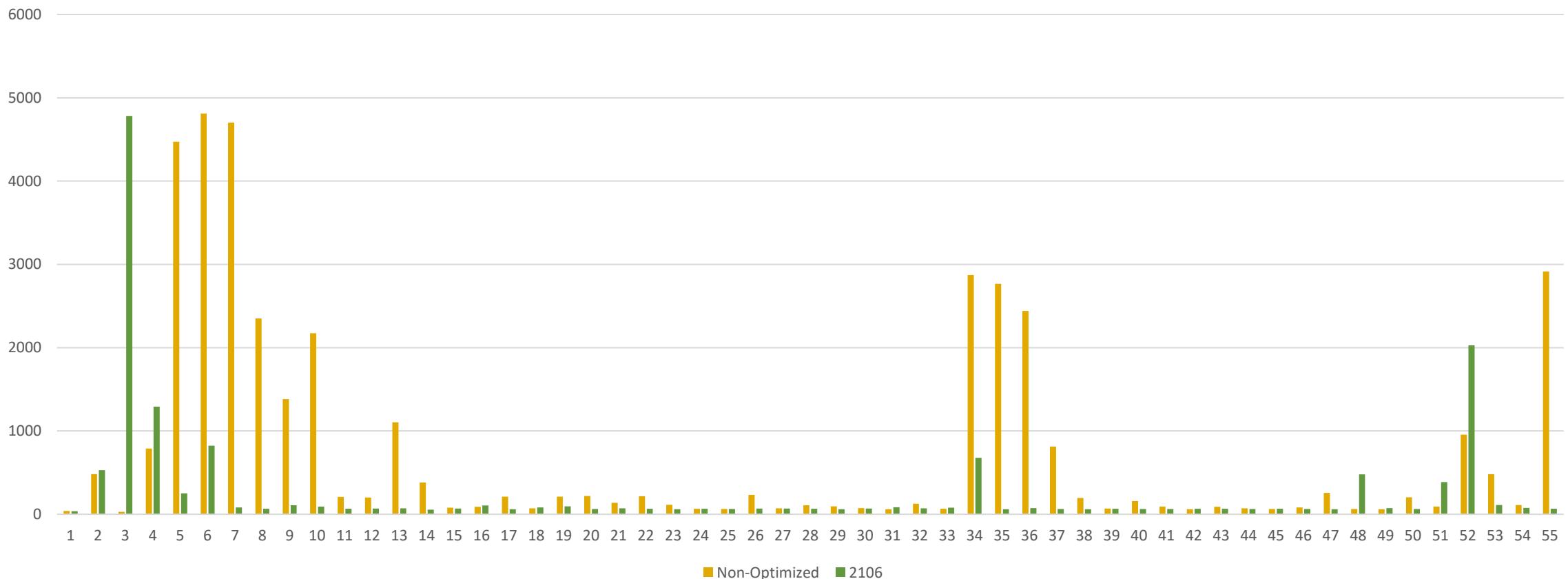


# Comparison Windows CPU Usage

Windows 10 21H1 Enterprise - - logon and then idle



Comparison

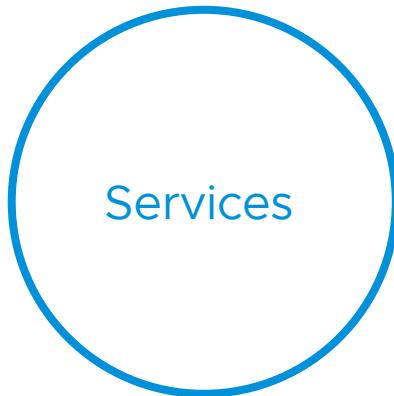


# What to Optimize?

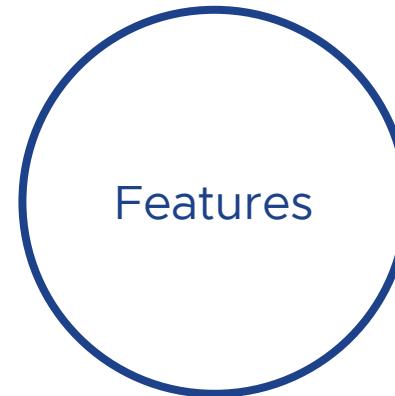
# What to Consider Optimizing



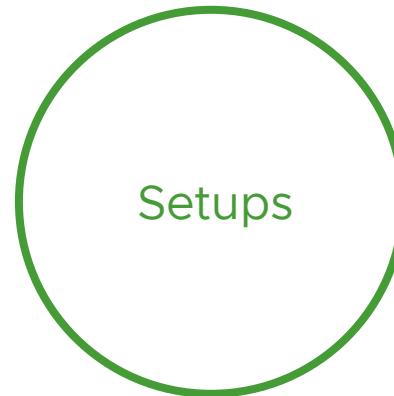
Application experience  
Disk scans, defrag,  
cleanup  
Shell indexer  
System restore  
Scheduled backup



Error reporting  
Routing / WiFi  
Search  
Superfetch /  
Branchcache  
Windows update  
Plug and play



Cortana  
Data collection  
Device installation



OneDrive  
.Net  
Explorer  
Themes

# Visual Effects

## App hardware acceleration

Disable app hardware acceleration if not using GPU

OSOT includes settings for

- Adobe Reader
- Google Chrome
- Internet Explorer
- Microsoft Edge
- Microsoft Office

## Visual effects

Animations

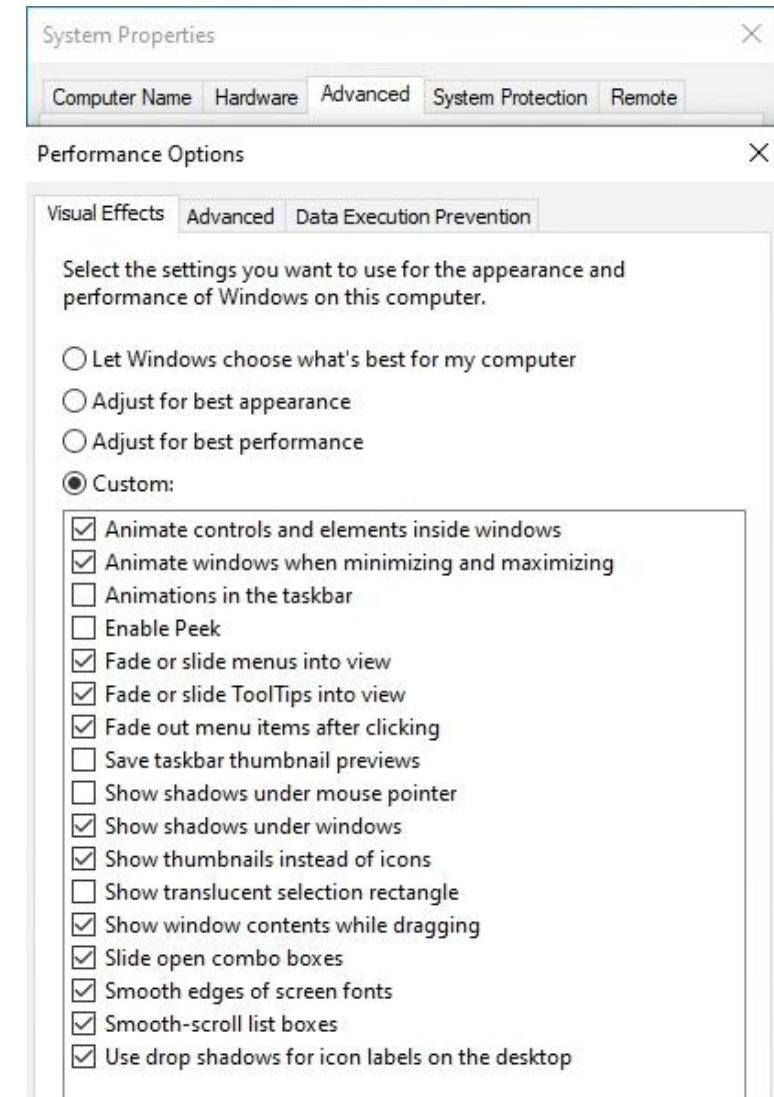
Peek

Fade

Shadows

Window contents while dragging

Default in OSOT is balanced selection



# How to Optimize?

Manual, OS Optimization Tool or other  
methods

# VMware OS Optimization Tool (OSOT)

<https://labs.vmware.com/flings/vmware-os-optimization-tool>

The screenshot shows the VMware OS Optimization Tool (OSOT) interface. At the top, there's a toolbar with icons for Optimize, Generalize, Finalize, Update, History, Templates, and References. The main window has a dark theme with a header bar showing 'System Information' and various system details like OS, Version, Processor, System Type, Windows Locale, and Display Adapter RAM. To the right of the header is a 'TM' logo and the number '2107'. Below the header is an 'Analysis Summary' chart with the following data:

Category	Total	Recommended	Optimization Applied
Optimization Not Applied	425	86	14
Optimization Applied	411	86	14

Below the chart is a table titled 'Optimizations' with columns for 'ExpectedValue', 'Actual Value', and 'Description'. The table lists several categories of optimizations, each with a checkbox and a description. Some categories have sub-items. At the bottom of the table are buttons for 'Analyze' and 'Optimize'.

Assists in optimizing

- Windows 10
- Server 2019/2016

Features

- Optimize
- Generalize
- Finalize
- Windows Update

Customizable templates to enable or disable

- Services
- Features
- Tasks
- Registry settings

# What's New in the OS Optimization Tool

## Productization

New UI

Optimize

- Common options wizard
- Import/ export selections

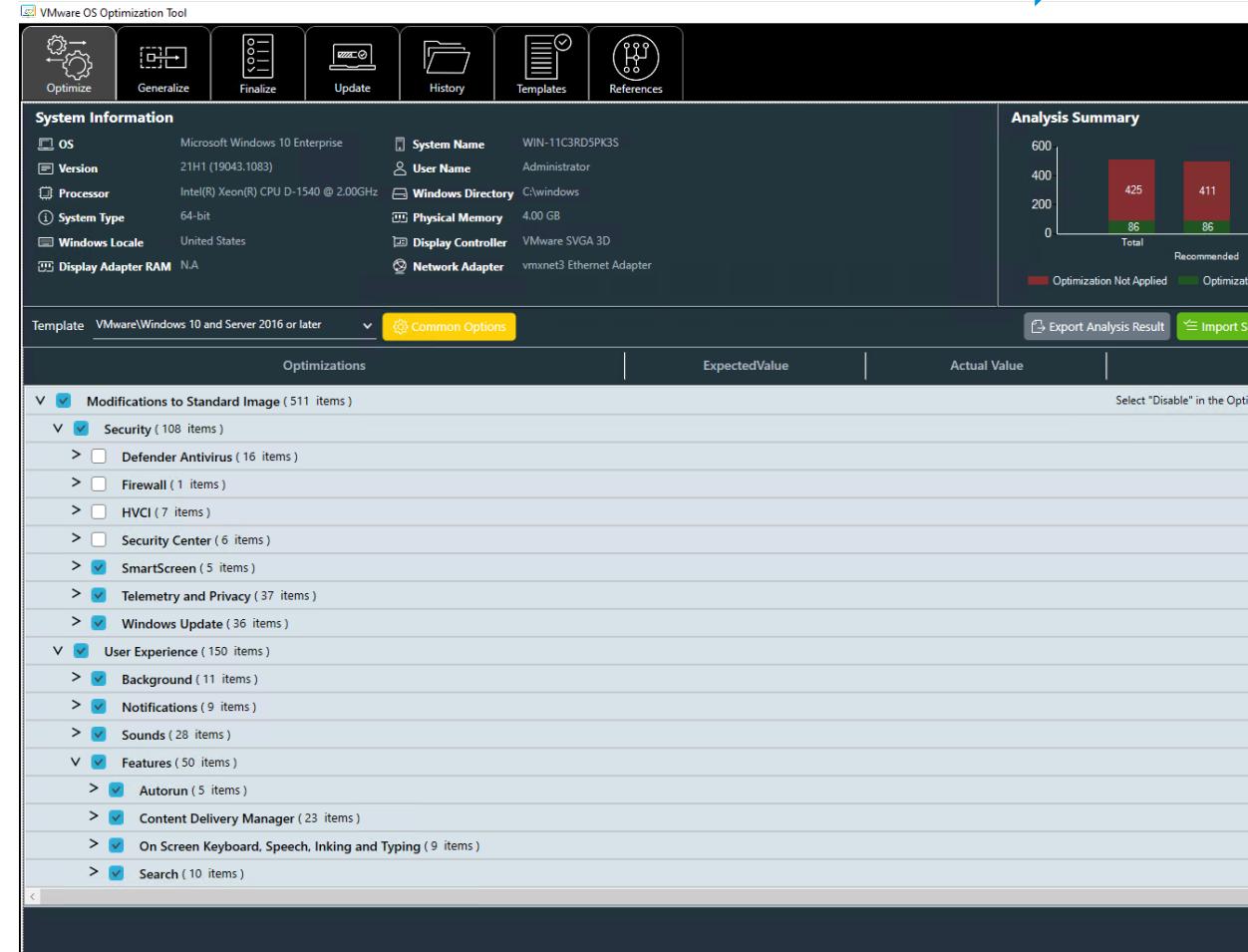
Template

- Single combined template
  - Windows 10 and Server 2016 or later
- Reorganized and reduced set of optimizations
- Search

Generalize

Finalize

Update

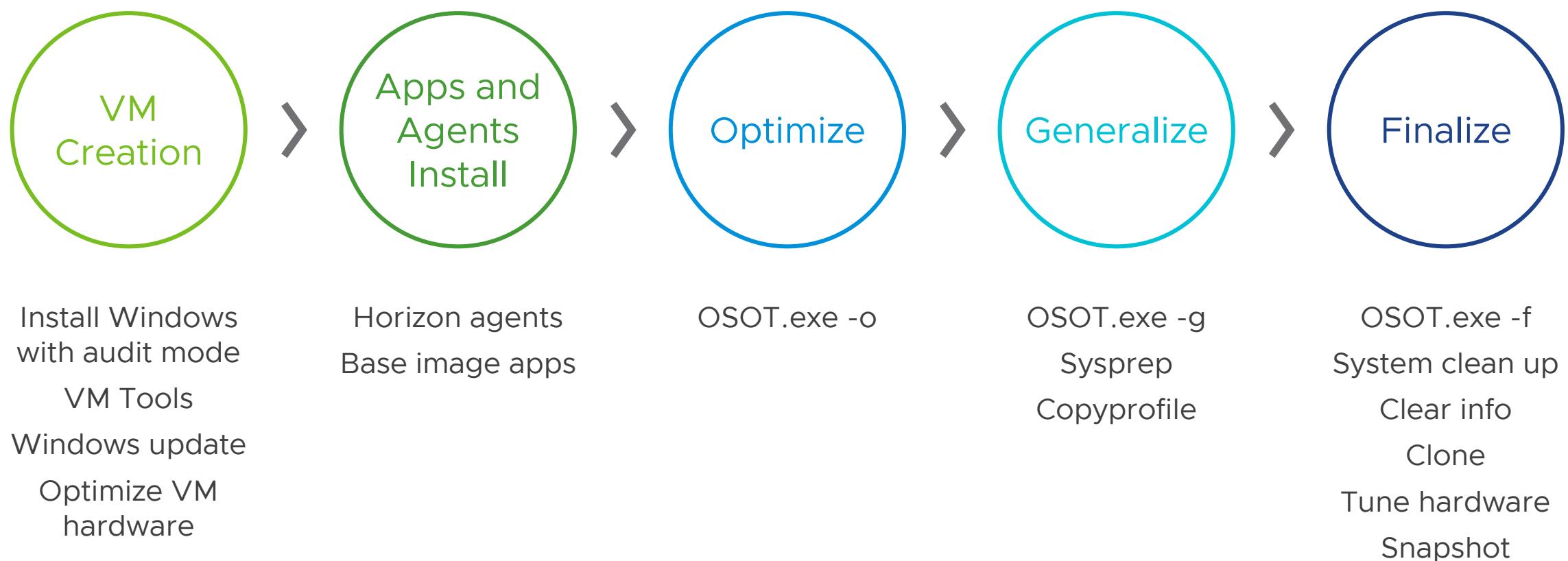


# Building an Optimized Image

How to, with demos

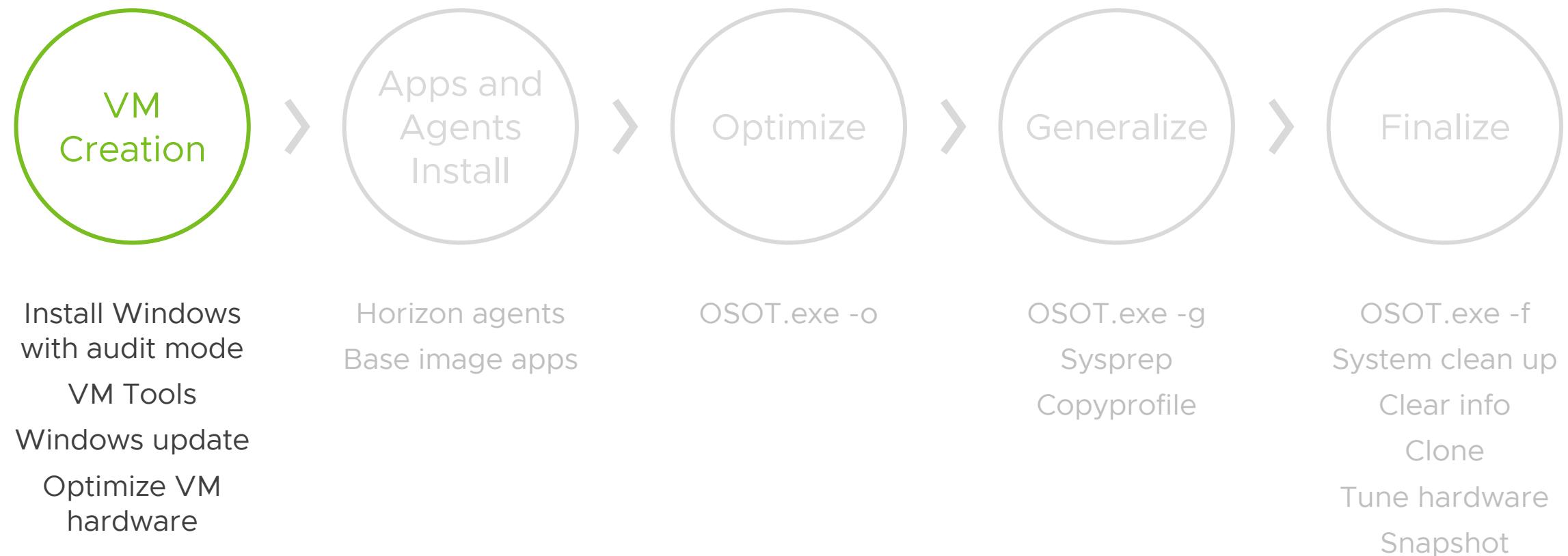
# Building an Optimized Image

<https://techzone.vmware.com/manually-creating-optimized-windows-images-vmware-horizon-vms>



# VM Creation

<https://techzone.vmware.com/manually-creating-optimized-windows-images-vmware-horizon-vms>



# Create VM and Install Windows

## Create VM and Install Windows

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Define VM hardware

Install Windows and enter audit mode

Configure Server for VDI or RDSH

- Remote Desktop services

Install VMware Tools

Run Windows Update

## Optimize the VM Hardware

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Use VMXNET3 for network card  
devices.hotplug = “FALSE”

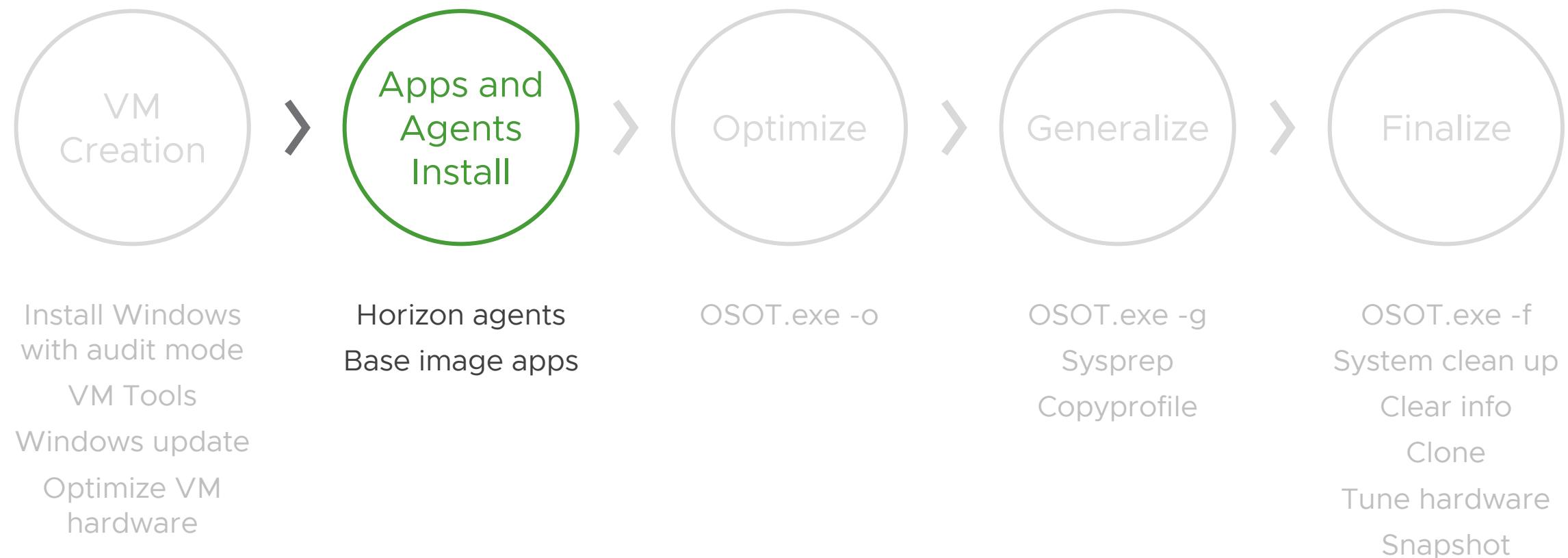
- [KB 1012225](#)

Remove unnecessary hardware

- USB Controller
- CD/DVD drive
- SATA controller

# Applications and Agents

<https://techzone.vmware.com/manually-creating-optimized-windows-images-vmware-horizon-vms>



# Install Apps and Agents

## Apps

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Install applications that are to be part of the base image

Watch for auto-update functionality

## Agents

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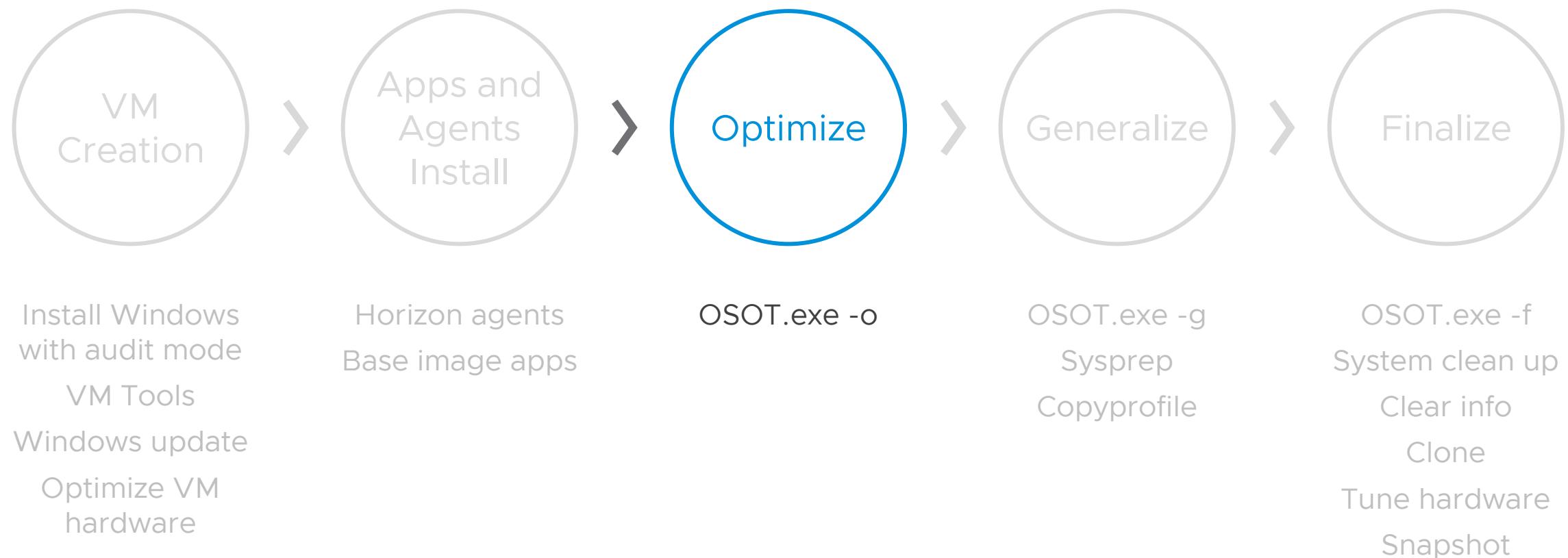
If using multiple solutions then you will need to install all appropriate agents

Installation (and update) order is important

1. Horizon Agent
2. Dynamic Environment Manager FlexEngine
3. App Volumes Agent

# Optimize

<https://techzone.vmware.com/manually-creating-optimized-windows-images-vmware-horizon-vms>



# Steps to Optimize the Image

The screenshot shows the VMware OS Optimization Tool interface. At the top, there is a toolbar with icons for Optimize, Generalize, Finalize, Update, History, Templates, and References. Below the toolbar, the 'System Information' section displays the following details:

Category	Value
OS	Microsoft Windows 10 Enterprise
Version	21H1 (19043.1083)
Processor	Intel(R) Xeon(R) CPU D-1540 @ 2.00GHz
System Type	64-bit
Windows Locale	United States
Display Adapter RAM	N.A.
System Name	WIN-11C3RD5PK3S
User Name	Administrator
Windows Directory	C:\windows
Physical Memory	4.00 GB
Display Controller	VMware SVGA 3D
Network Adapter	vmxnet3 Ethernet Adapter

Below the system information, there is a 'Template' dropdown set to 'VMware\Windows 10 and Server 2016 or later' and a 'Common Options' button. The main area is titled 'Optimizations' and shows a list of items under 'Modifications to Standard Image' (511 items). The items are categorized and some are checked:

- Security (108 items): Defender Antivirus (16 items), Firewall (1 item), HVCI (7 items), Security Center (6 items), SmartScreen (5 items), Telemetry and Privacy (37 items), Windows Update (36 items).
- User Experience (150 items).

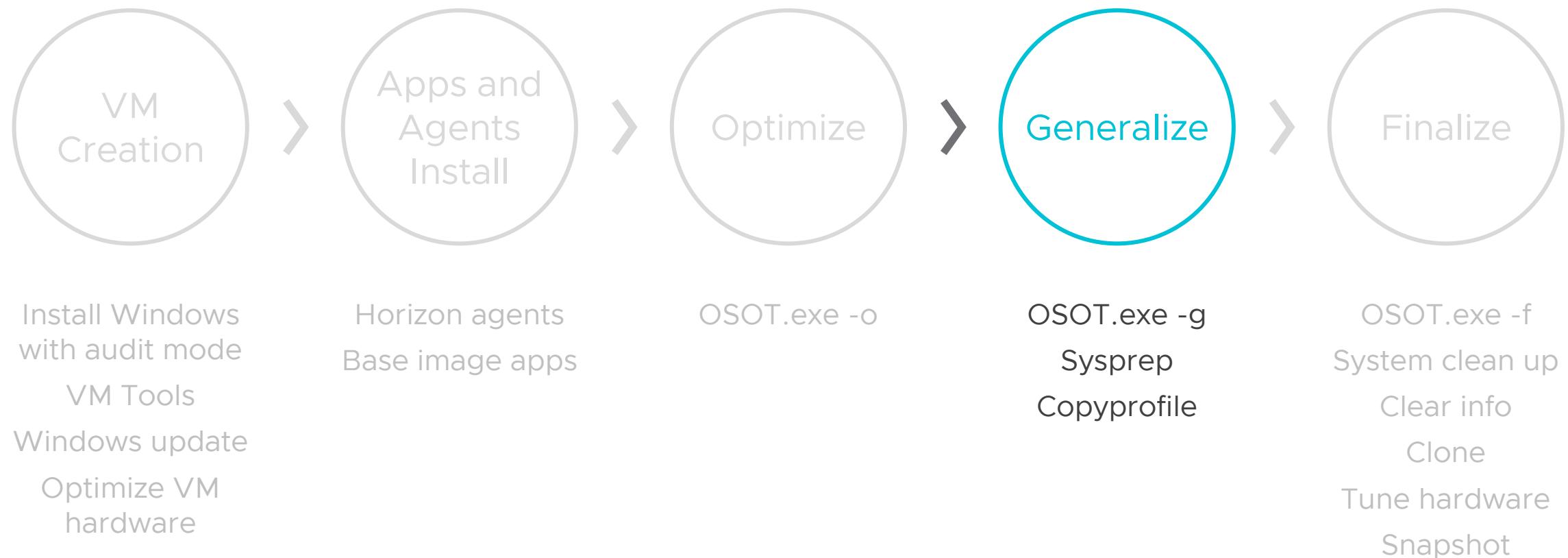
Snapshot before making changes

## Steps

1. Analyze
2. Common options
3. Fine tune template selections (optional)
4. Optimize

# Generalize

<https://techzone.vmware.com/manually-creating-optimized-windows-images-vmware-horizon-vms>



# Image Generalization

## Prepare the OS

### Generalize

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Take Windows out of audit mode

Removes computer-specific information

- Create generic image
- Sysprep

Also does some other optimizations that are best done at the same time as Sysprep

### Domain Join?

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Optional

Usually, try not to join the machine to a domain

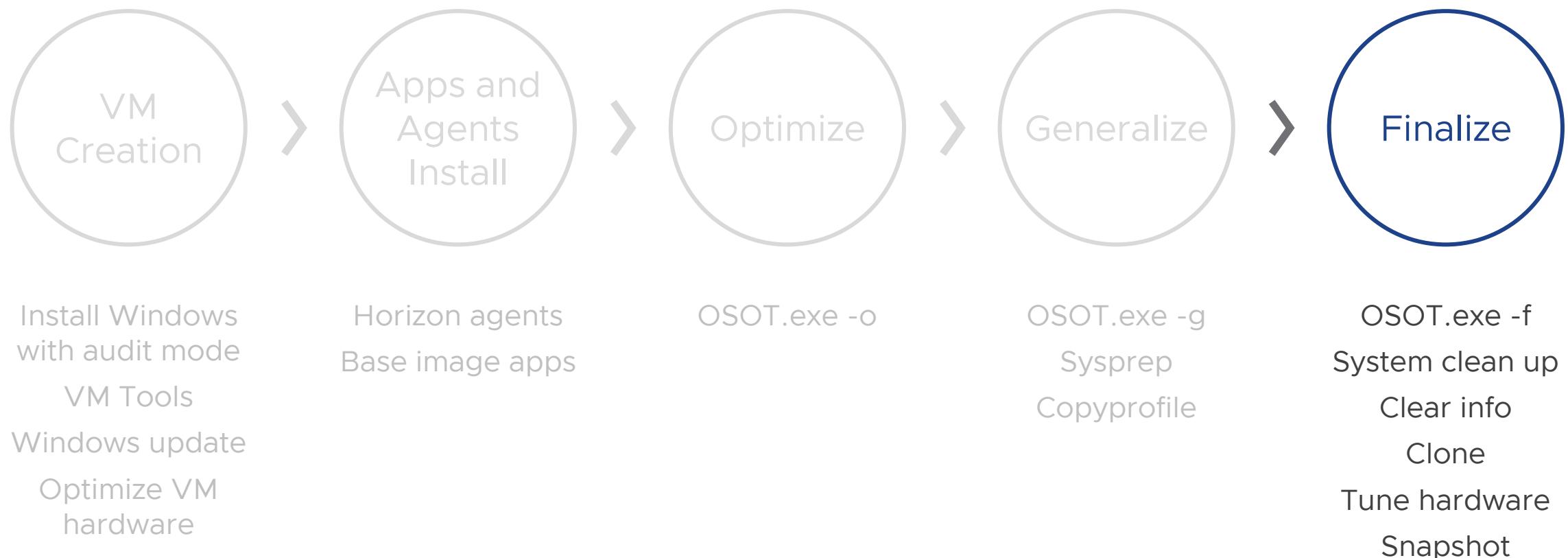
Joining a machine to a domain should be part of the deployment process

- Not part of image creation and optimization

Image can be used across multiple domains

# Finalize

<https://techzone.vmware.com/manually-creating-optimized-windows-images-vmware-horizon-vms>



# Finalize and Prepare For Use

## System Clean Up

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- Run Ngen, DISM, Compact
- Pre-compile .NET Framework
- Saves space on image
- Run Disk clean-up
  - Remove temporary files
  - Empty the recycle bin
  - Remove other unneeded files
- Zero empty disk space
  - SDelete

## Clear Information

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- Delete event logs
- Clear the KMS host information
  - Key Management Service
- DNS & IP
  - Flush DNS
  - Release IP address

## After Finalize

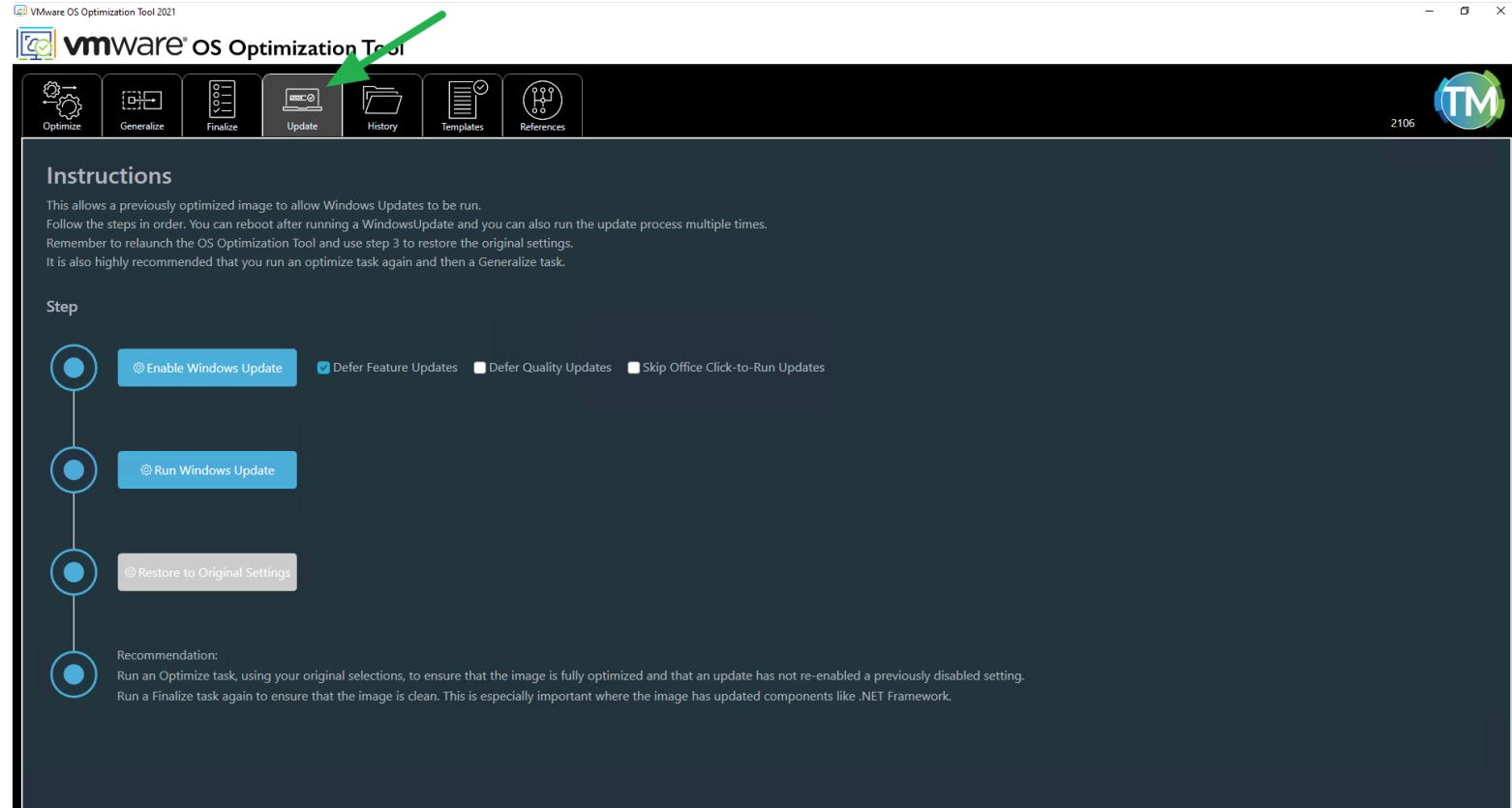
---

- Shutdown
- Clone
  - Free unused disk space
  - Reduce size and optimize disk
  - Speed up disk copies and clone operations
- Adjust CPU and memory
- Snapshot
- Create or update pool/farm

# Windows Update on an Optimized Image

# Running Windows Update on an Optimized Image

Now part of the OS Optimization Tool



## Enable Windows Update

- Changes required registry values
- Changes local group policy
- Enables required services

## Run Windows Update

- Starts Windows update process
- Opens Windows UI setting page

## Restore settings

- Returns all settings to their original values
- Disable scheduled tasks that get regenerated

## Post recommendations

- Rerun Optimize task using original settings
- Run Finalize task

# Using Automation

# Microsoft Deployment Toolkit Plug-in

## Overview

Automate the creation of golden images

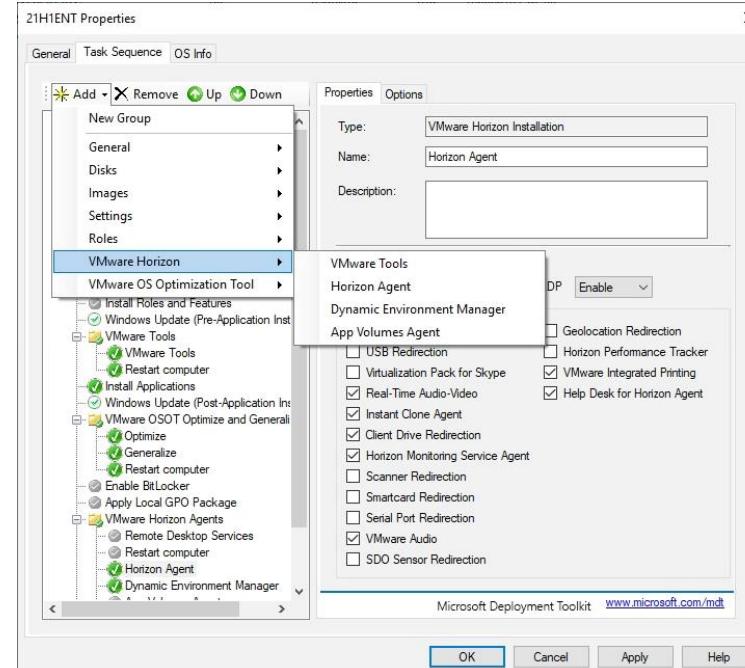
## Microsoft Deployment Toolkit

- PXE boot
- OS install
- Application install
- Customization

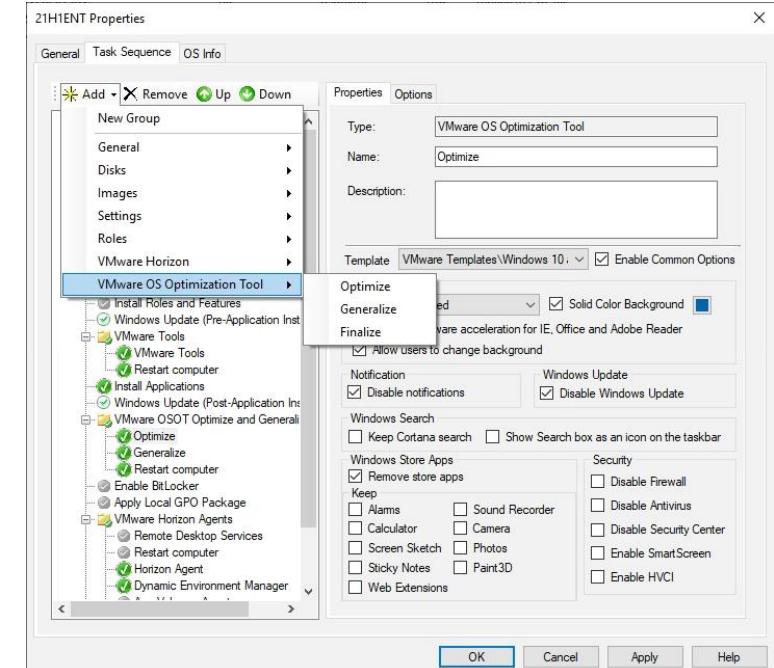
## OS Optimization Tool plug-in

- Add custom tasks to task sequences

## Install agents



## Run OS optimization tasks



# Using Automation to Create Optimized Windows Images

<https://techzone.vmware.com/using-automation-create-optimized-windows-images-vmware-horizon-vms>

Use the guide for full step by step instructions

The screenshot shows a VMware website with a navigation bar at the top. The main content area displays a guide titled "Install the Windows Assessment and Deployment Kit (ADK)". On the left, there's a sidebar with a table of contents for the guide, including sections like Introduction, Installation, Configuration, Deployment, and Conclusion. The "Installation" section is expanded, showing five steps: 1. Install the Windows Assessment and Deployment Kit (ADK), 2. Install the Windows Preinstallation Environment (PE) ADK Add-on, 3. Install Microsoft SQL Server, 4. Install the Microsoft Deployment Toolkit (MDT), and 5. Install Windows Deployment Services. Below the table of contents, there's a "Specify Location" dialog box with a radio button selected for "Install the Windows Assessment and Deployment Kit - Windows 10 to this computer" and an "Install Path" field containing "C:\Program Files (x86)\Windows Kits\10\".

Community Rating: ★★★★☆ Your Rating: ★★★★☆

Print to PDF Tags Share Pin Feedback

## Install the Windows Assessment and Deployment Kit (ADK)

We start with an Active Directory joined Windows Server (we used Server 2019) VM, registered in DNS. If you do not create many VMs at the same time, 2 vCPUs and 4 GB of RAM are more than enough, but size according to your needs. We are using a 200-GB secondary disk because we want to build all images that we support. For only a single image or a couple of images, however, you do not need that much storage.

As was mentioned in the introduction to this guide, we are going to combine Windows Deployment Services, the MDT deployment share, the SQL server, and the MDT console on a single machine, but you can adjust this to your wishes.

The Windows Assessment and Deployment Kit (Windows ADK) has tools for customizing Windows images for large-scale deployments. MDT uses the ADK to modify the Windows Preinstallation Environment bootable image.

### 1. Download Windows Assessment and Deployment Kit (ADK)

Download and run [ADKSETUP](#).

### 2. Specify the Installation Path

Windows Assessment and Deployment Kit - Windows 10

**Specify Location**

Install the Windows Assessment and Deployment Kit - Windows 10 to this computer

Install Path:

C:\Program Files (x86)\Windows Kits\10\

Browse...

# Backend Installation

MDT, SQL and Windows Deployment Services

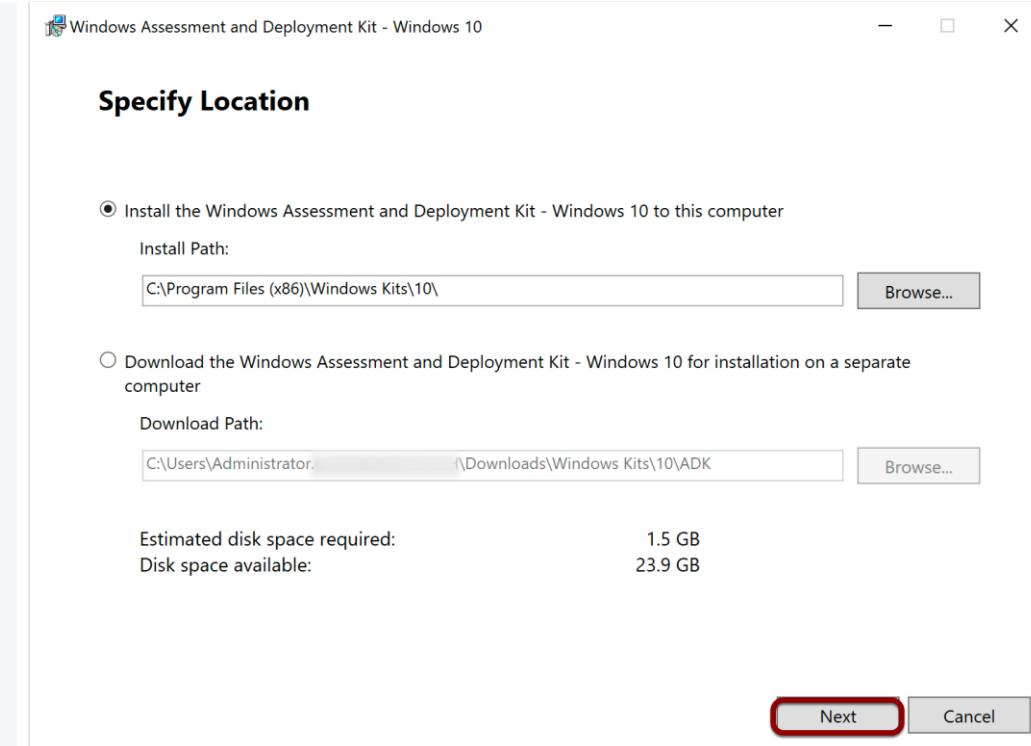
Microsoft Windows Assessment and Deployment Kit  
(ADK)

Microsoft Windows Preinstall Environment ADK Add-on  
(PE)

Microsoft SQL Server (Optional)

Microsoft Deployment Toolkit (MDT)

Microsoft Windows Deployment Services (WDS)



# Backend Configuration

## SQL, MDT and WDS

### SQL Server

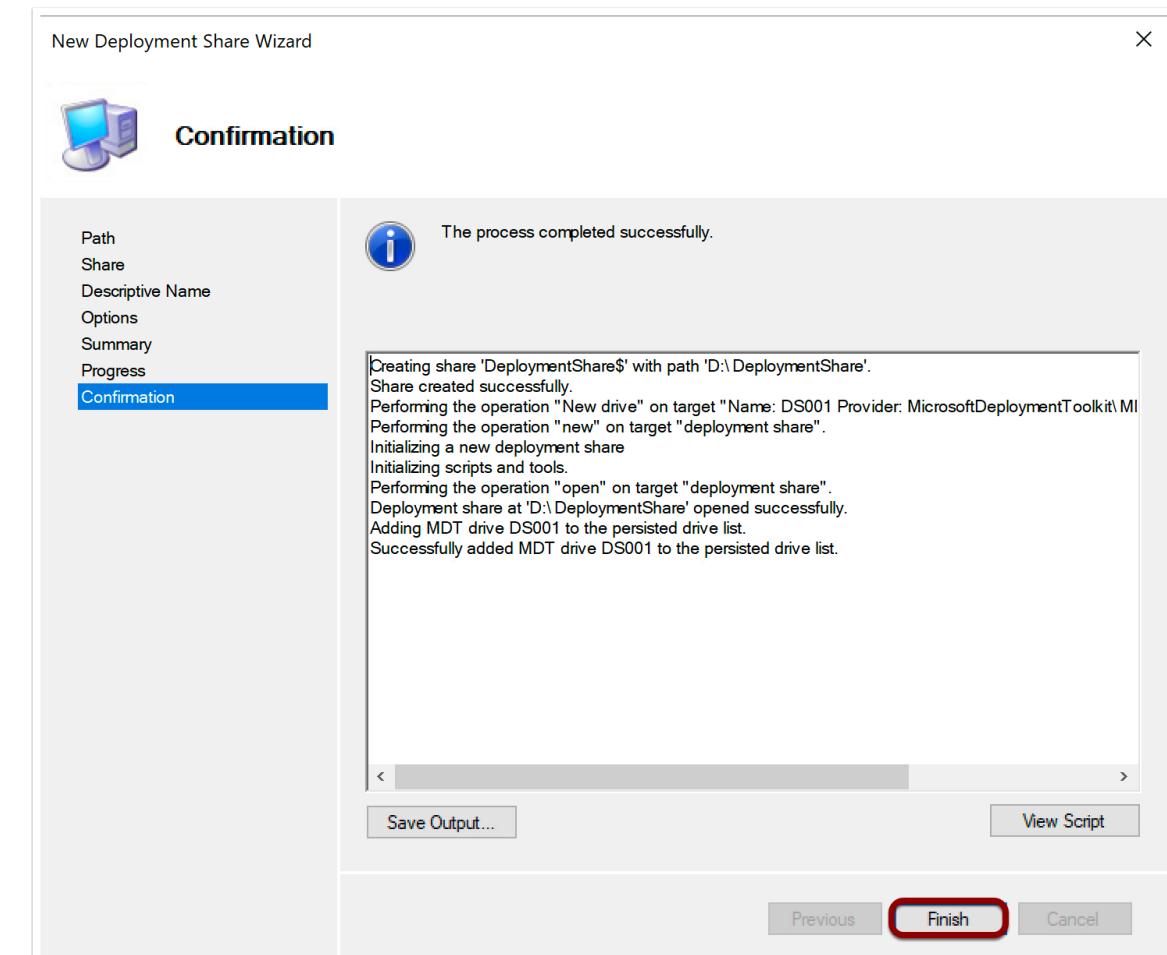
- Named Pipes and TCP/IP + firewall

### Microsoft Deployment Toolkit

- Deployment share + drivers
- Database (optional)

### Windows Deployment Services

- Enable PXE and set TFTP properties
- Add MDT boot image



# Deployment Configuration

OSOT Plugin, Horizon Agents, MDT and Scripts

## VMware OSOT Plug-in and Horizon Agents

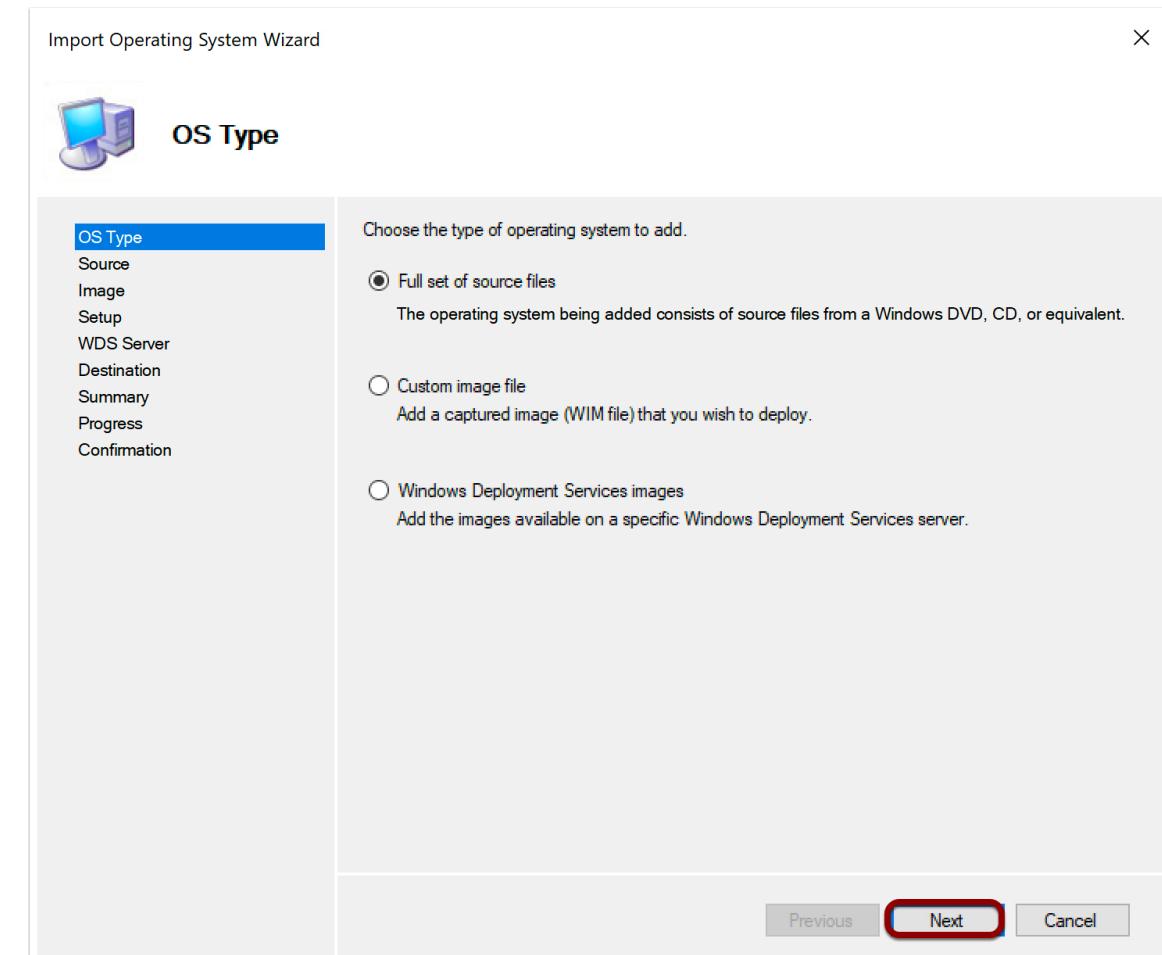
- Copy to deployment share

## Microsoft Deployment Toolkit

- Add operating systems
- Create task sequences (demo)

## Scripts

- Create and deploy VMs (demo)
- Export VMs



# Next Steps



## Use the how-to guides



### *Manually Creating Optimized Windows Images* guide

- <https://techzone.vmware.com/manually-creating-optimized-windows-images-vmware-horizon-vms>

### *Using Automation to Create Optimized Windows Images* guide

- <https://techzone.vmware.com/using-automation-create-optimized-windows-images-vmware-horizon-vms>

## OSOT user guide



### *VMware Operating System Optimization Tool* guide

- <https://techzone.vmware.com/resource/vmware-operating-system-optimization-tool-guide>



DIGITAL WORKSPACE  
TECH ZONE

[techzone.vmware.com](https://techzone.vmware.com)

Your Fastest Path to Understanding,  
Evaluating and Deploying VMware Products

## Other Tech Zone Sites

[go.techzone.vmware.com](https://go.techzone.vmware.com)

CARBON BLACK  
TECH ZONE  
[carbonblack.vmware.com](https://carbonblack.vmware.com)

THE CLOUD PLATFORM  
TECH ZONE  
[core.vmware.com](https://core.vmware.com)

NETWORKING AND  
SECURITY TECH ZONE  
[nsx.techzone.vmware.com](https://nsx.techzone.vmware.com)

VMWARE CLOUD  
TECH ZONE  
[vmc.techzone.vmware.com](https://vmc.techzone.vmware.com)



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