



The science behind the report:

Shorten your VMware vMotion migrations with Intel Xeon 6 and Intel QuickAssist Technology (QAT)

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report Shorten your VMware vMotion migrations with Intel Xeon 6 and Intel QuickAssist Technology (QAT).

We concluded our hands-on testing on July 20, 2026. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on July 14, 2026 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

To learn more about how we have calculated the wins in this report, go to <https://facts.pt/calculating-and-highlighting-wins>. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Table 1: CPU utilization percentages during the median encrypted vMotions test runs and the median times to complete those migrations. Source: PT.

	Intel® QAT enabled	Intel QAT disabled
Active VMs		
Source CPU utilization %	80.5	75.9
Destination CPU utilization %	33.4	34.4
Time to complete vMotion of six VMs	1:32	2:03

System configuration information

Table 2: Detailed configuration information for the server under test.

System configuration information	HPE ProLiant Compute DL360 Gen12
BIOS name and version	U68 v1.80
Non-default BIOS settings	N/A
Operating system name and version/build number	ESXi 9.1 25370933
Date of last OS updates/patches applied	07/14/2026
Power management policy	Balanced
Processor	
Number of processors	2
Vendor and model	Intel® Xeon® 6737P
Core count (per processor)	32
Core frequency (GHz)	2.90
Stepping	1
Memory module(s)	
Total memory in system (GB)	1,024
Number of memory modules	32
Vendor and model	Hynix HMCG94AHBRA487N
Size (GB)	64
Type	PC5
Speed (MHz)	6,400
Speed running in the server (MHz)	6,400
Storage controller	
Vendor and model	HPE MR408i-o Gen11
Cache size (GB)	4
Firmware version	52.36.3-6584
Local storage	
Number of drives	4
Drive vendor and model	MO001600KXNZV
Drive size (GB)	1,600
Drive information (speed, interface, type)	NVMe SSD
Network adapter	
Vendor and model	Intel Ethernet Network Adapter E810-CQDA2
Number and type of ports	2x 100GbE
Driver version	4.91

System configuration information		HPE ProLiant Compute DL360 Gen12
Cooling fans		
Vendor and model		HPE
Number of cooling fans		7
Power supplies		
Vendor and model		P38997-B21
Number of power supplies		2
Wattage of each (W)		1,600

Setting up the testing environment

Installing and configuring VMware ESXi on the hosts

We checked for firmware updates and ensured we had the most recent BIOS version on each host before we installed VMware ESXi™. We used an HPE ESXi 9.1 image.

Installing ESXi

1. Load the ESXi 9.1 image onto the system using the iLO console.
2. To start the installation process, turn on the server, or reboot the server and boot into the ISO.
3. On the welcome screen, press Enter.
4. To accept the EULA, press Enter.
5. Select the disk to which you wish to install the OS, and press Enter.
6. If prompted, confirm your disk selection, and approve a data wipe of those disks.
7. Choose the keyboard type, and press Enter.
8. Enter your password, and press Enter.
9. To initiate the installation, press F11.
10. After the installation completes, press Enter to reboot the host.
11. Complete steps 1 through 10 on all three hosts.

Setting a static IP on the host

1. Once the system finishes booting into the new OS, press F2 to open the configuration menu.
2. Enter the password, and press Enter.
3. Navigate to Configure Management Network, and press Enter.
4. Navigate to IPv4 Configuration, and press Enter.
5. Choose Set static IPv4 address and network configuration.
6. Enter the static IP, subnet mask, and default gateway.
7. To save the changes, press Enter.
8. Press Escape, and save the changes when prompted.
9. In a browser, log into the local ESXi host console with the new IP to confirm all is working.
10. Complete steps 1 through 9 on all three hosts.

Deploying VMware vCenter Server 9.1

We deployed a white box infrastructure server with ESXi for each testbed to host the vCenter Server® VM and the HammerDB clients.

1. Download the VMware VCSA installer to a Windows system on the same network as the ESXi hosts.
2. Mount the ISO to the DVD Drive, and navigate to the vcsa-ui-installer folder.
3. Open the win32 folder, and double-click the installer.exe file.
4. To install a new vCenter Server, click Install.
5. On the Introduction screen, click Next.
6. Accept the EULA, and click Next.
7. Enter the IP address, username, and password of the infrastructure host. Click Next.
8. On the Certificate Viewer popup, click Accept.
9. Enter a name and password for the vCenter Server VM, and click Next.
10. Choose the Small deployment size from the dropdown menu, and leave the storage size set to Default. Click Next.
11. Choose the datastore to host the vCenter VM, and select Enable Thin Disk Mode. Click Next.
12. Enter the static IP address, subnet mask, default gateway, and DNS servers for your vCenter Server, and click Next.
13. On the Ready to complete stage 1 screen, review your selections, and click Finish.
14. Once the Stage 1 deployment completes, press Continue.
15. Ensure Stage 2 is selected, and click Next.
16. On the configuration screen, choose Synchronize time with the NTP servers, and enter the IP or URL of an NTP server (we used pool.ntp.org).
17. Also on the configuration screen, set SSH access to Activated. Click Next.
18. On the single sign-on (SSO) configuration screen, set the SSO domain name (we kept vsphere.local), username, and password. Click Next.
19. Deselect the Join the Customer Experience Improvement Program (CEIP), and click Next.
20. Review your settings, and click Finish.
21. When the installation completes, click Close.
22. In a browser, navigate to the IP of the vCenter Server, and log in with your username@domain and password.

Creating and configuring the vSAN cluster

We created a cluster with a VM/management network, a vMotion network, and a vSAN distributed switch. The networks used 100GbE NICs on the servers.

Adding hosts to the vSphere Client

1. In the vSphere Client console, right-click the vCenter IP in the left pane, and click New Datacenter....
2. Enter a name for the data center, and click OK.
3. In the left pane, right-click the newly created data center, and click Add Host....
4. Enter the IP address of the first host in the cluster, and click Next.
5. Enter the host's username and password, and click Next.
6. Review the summary, and click Next.
7. Choose Extract the image on the host, and click Next.
8. On the Security Alert popup, click Yes.
9. Once the image loads, click Next.
10. Choose a license, and click Next.
11. Leave the default (Disabled) on the Lockdown mode screen, and click Next.
12. Select the data center you created, and click Next.
13. Review your configuration, and click Finish.
14. Complete steps 1 through 13 with each of the three hosts.

Creating a host cluster

1. In the vSphere Client console, right-click the Datacenter in the left pane, and choose New Cluster....
2. On the Basics screen, name the cluster, and enable vSAN.
3. Also on the Basics screen, select Extract an image from a host in this vCenter instance, and click Next.
4. Choose one of the three hosts in your vCenter instance, and click Extract Image.
5. Once the image extracts, click Next.
6. Review your settings, and click Finish.
7. Complete steps 1 through 6 for all three hosts.

Configuring VMware vSAN

1. In the left pane in the vSphere Client console, click the cluster you created, and navigate to the Configure tab.
2. Under Configuration, click Quickstart.
3. The Cluster basics step should already show a green checkbox to indicate that you have enabled vSAN.
4. On step 2 Add hosts, click Add.
5. Enter the IP addresses, usernames, and passwords of all three hosts. Click Next.
6. On the Host summary screen, review and resolve any issues, and click Next.
7. On the Import Image screen, choose Don't import an image, and click Next.
8. Review, and click Finish.
9. On step 3 in the Quickstart page, click Configure.
10. On the Distributed switches screen, choose one distributed switch, name it, and accept the default port groups. Add the physical adapter that aligns with the NIC you want to use for the vSAN and vMotion network. Click Next.
11. On the Storage traffic screen, enter IP addresses for each host, and click Next.
12. On the Advanced options screen, leave defaults, and click Next.
13. On the Claim disks screen, expand each host, and choose the disks for vSAN to claim.
14. When vSAN has claimed all disks, click Next.
15. On the Proxy settings screen, leave defaults, and click Next.
16. Review your settings, and click Finish.
17. If there are any warnings or errors, resolve them, and click re-validate until your cluster is ready.

Setting up the vSphere Microsoft SQL Server VMs

We performed the following steps in a fully updated VMware vSphere environment.

Installing and configuring the base SQL image

Creating a gold VM

1. Log into the vCenter console.
2. Right-click the system under test, and select New Virtual Machine.
3. In Select a creation type, select Create a new virtual machine, and click Next.
4. In Select a name and folder, name the VM gold-sql, and click Next.
5. In Select a compute resource, click Next to accept defaults.
6. In Select storage, choose the storage you set up for your client VMs, and click Next.
7. In Select compatibility, click Next to accept defaults.
8. In Select a guest OS, choose Windows → Windows Server 2025, and click Next.
9. Choose the following options for the new VM:
 - CPU: 8
 - RAM: 80 GB
 - Storage
 - Hard disk 1: 40 GB
 - Hard disk 2: 120 GB
 - Hard disk 3: 200 GB
10. Verify that you chose the correct options, and click Next.
11. In Ready to complete, verify that you've applied the correct details, and click Next.
12. Right-click your new VM, and select Power → Power On.
13. Open a console to the new VM.
14. When prompted, press any key to boot into the Windows Server 2025 ISO.
15. On the Select Language settings screen, leave defaults, and click Next.
16. On the Select keyboard settings screen, leave defaults, and click Next.
17. On the Select setup option screen, choose Install Windows Server, check the box to agree to deleting everything, and click Next.
18. On the Select Image screen, choose Windows Server 2025 Standard Evaluation (Desktop Experience), and click Next.
19. On the Select location to install Windows Server screen, choose the OS disk, and click Next.
20. On the Ready to install screen, click Install.
21. After the install finishes and the VM reboots, on the Customize settings screen, enter an administrator password into the Password and Reenter Password fields. Click Finish.

Disabling Windows Firewall

1. Log into Windows, and select to share only required data to Microsoft.
2. In the Windows Search bar, type Firewall
3. Click Windows Defender Firewall with Advanced Security.
4. Under the Public Profile section, click Windows Defender Firewall Properties.
5. On the Domain profile page, under Firewall State, click the drop-down menu, and select Off.
6. Click Private profile, and under Firewall State, click the drop-down menu, and select Off.
7. Click Public profile, and under Firewall State, click the drop-down menu, and select Off.
8. Click OK.
9. Right-click the gold VM, and select Manage → Install VMware Tools.
10. In the VM, open Windows Explorer, and run the VMware Tools executable.
11. Choose to install VMware Tools with defaults.

Enabling Remote Desktop on WS2025

1. In Server Manager, click Local Server.
2. On the Local Server properties page, next to Remote Desktop, click Disabled to open the System Properties window.
3. In the System Properties menu, select Allow remote connections to this computer.
4. On the warning that appears, click OK.
5. To exit, click OK.

Enabling Remote SSH Access

1. From Server Manager, click Local Server.
2. On the Local Server properties page, scroll down, and next to Remote SSH Access, select Disabled to open a PowerShell prompt.
3. When prompted, type Yes, and press Enter.

Setting a static IP address

1. In the Windows Search bar, type Control Panel
2. Right-click the Ethernet port, and click Properties.
3. Double-click Internet Protocol Version 4 (TCP/IPv4).
4. Click Use the following IP address, and enter a static IP address for your network.
5. Click Use the following DNS server addresses, enter a static DNS address for your network, and click OK.
6. To close the Ethernet Properties window, click OK.

Running Windows Update

1. In the Windows Search bar, type Update, and click Check for updates.
2. Click Check for Updates.
3. Click Install All.
4. If prompted, restart Windows.
5. Once all updates are complete, choose to suspend updates for five weeks in the Windows Update window.

Installing and configuring SQL Server 2025 on the gold VM

1. Attach the installation media ISO for SQL Server 2025 to the VM.
2. Double-click the Setup application.
3. In the left pane, click Installation.
4. Click New SQL Server stand-alone installation or add features to an existing installation.
5. Select Evaluation, and click Next.
6. Check the box to accept the license terms, and click Next.
7. Click Use Microsoft Update to check for updates, and click Next.
8. On the Install Rules page, click Next.
9. Check the boxes for the following features, and click Next:
 - Database Engine Services
 - Full-Text and Semantic Extractions for Search
10. Leave the default instance, and click Next.
11. Leave the default Service Accounts, and click Next.
12. On the Server Configuration tab, choose Mixed Mode, and enter and confirm a password for the SQL Server system administrator account.
13. Under Specify the SQL Server administrators, click Add Current User.
14. On the Data Directories tab, change the data root directory to the database volume.
15. Choose the log volume for the User database log directory.
16. If you plan to have a locally stored backup, change the Backup directory to point to it.
17. Click Next.
18. At the Error and usage reporting screen, click Next.
19. At the Installation Configuration Rules screen, check that there are no failures or relevant warnings, and click Next.
20. At the Ready to Install screen, click Install.
21. Close the installation window.
22. Download and install SQL Server Management Studio.

Installing Microsoft ODBC Driver 18 for SQL Server

1. Download the latest ODBC Driver for SQL Server from <https://learn.microsoft.com/en-us/sql/connect/odbc/download-odbc-driver-for-sql-server>.
2. Double-click the .exe file, and click Next.
3. Check the box to accept the terms, and click Next.
4. Click Next.
5. Click Install.
6. Click Finish.

Configuring the test database

Creating the database

1. Open SQL Server Management Studio.
2. Right-click Databases → New Database.
3. Name the database. We named ours tpcc.
4. Navigate to the Filegroups tab, and create a new primary filegroup.
5. Navigate to the Files tab, and to add a data file, click Add.
6. Repeat step 5 until you have three total data files.
7. Pregrow the log file to 20,480 MB.
8. Rename the database files, change their locations to the appropriate path (E:\data for database files and F:\log for log files), and click OK.

Setting up the HammerDB clients

We ran the HammerDB clients as VMs from a separate vSphere server that we monitored during testing to ensure there were no bottlenecks and that the client VMs would not impact results.

Installing and configuring the client image

1. Log into the vCenter console.
2. Right-click the system under test, and select New Virtual Machine.
3. In Select a creation type, select Create a new virtual machine, and click Next.
4. In Select a name and folder, name the VM gold-client, and click Next.
5. In Select a compute resource, click Next to accept defaults.
6. In Select storage, choose the storage you set up for your client VMs, and click Next.
7. In Select compatibility, click Next to accept defaults.
8. In Select a guest OS, choose Windows → Windows Server 2025, and click Next.
9. Choose the following options for the new VM:
 - CPU: 8
 - RAM: 16 GB
 - Storage: 40 GB
10. Verify that you chose the correct options, and click Next.
11. In Ready to complete, verify that you've applied the correct details, and click Next.
12. Right-click your new VM, and select Power → Power On.
13. Open a console to the new VM.
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3. Click Install All.
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5. Once all updates are complete, choose to suspend updates for five weeks in the Windows Update window.

Initializing the HammerDB TPROC-C database and backing up the database

1. Open HammerDB, and click Options → Benchmark.
2. Choose MSSQL Server and TPROC-C.
3. Expand SQL Server → TPROC-C → Schema Build.
4. Double-click Options.
5. Choose 800 warehouses, and set the number of virtual users corresponding to the number of vCPUs.
6. Change to user authentication instead of Windows authentication, and enter your sa username and password.
7. Check the box for clustered column store, uncheck the box for BCP, and click OK.
8. Double-click Build. This build could take a few hours.
9. After you create the database, use SSMS to log into the SQL Server.
10. Right-click the tpcc database, and select Tasks → Back Up.
11. In the Back Up Database window, change the destination to F:\backup\backup.bak.
12. In the Backup Options tab of the Back Up Database window, set backup compression to Compress backup, and click OK.
13. After a few minutes, the database backup will complete.
14. Shut down the HammerDB client and SQL VMs.

Cloning VMs to prepare for testing

Cloning and configuring the HammerDB client VMs

1. Right-click the gold client VM, and select Clone → Clone to Virtual Machine.
2. In Select a name and folder, enter the name for the first HammerDB client, and click Next.
3. In Select a compute resource, select your infrastructure host, and click Next.
4. In Select storage, select your client VM storage, and click Next.
5. In Select clone options, accept defaults, and click Next.
6. In Ready to complete, verify your options, and click Finish.
7. When the VM has finished cloning, log into it, and make the IP address of the VM unique.
8. Change the VM hostname.
9. Complete steps 1 through 8 for all six clients.

Cloning and configuring the vSphere SQL Server host VMs

Perform the following steps only after the HammerDB clients have initialized the SQL database on the gold VM, as described in Initializing the HammerDB TPROC-C database and backing up the database section.

1. Right-click the gold SQL VM, and select Clone → Clone to Virtual Machine.
2. In Select a name and folder, enter the name for the first SQL Server VM, and click Next.
3. In Select a compute resource, select your system under test host, and click Next.
4. In Select clone options, accept defaults, and click Next.
5. In Ready to complete, verify your options, and click Finish.
6. When the VM has finished cloning, log into it, and make the IP address of the VM unique.
7. Change the VM hostname.
8. Complete steps 1 through 7 for all six SQL Server VMs.

Running the vMotion test

Disabling or enabling the Intel QAT driver

To disable the driver, type `esxcli system module set --enabled=false --module=qat`. To enable the driver, type `esxcli system module set --enabled=true --module=qat`. Ensure you disable or enable the driver on the console for both hosts. After enabling or disabling the driver, reboot the hosts.

Performing a HammerDB test run and the migration test

1. On all HammerDB client VMs, open HammerDB and make sure your previously selected options are still selected.
2. Make sure the virtual user count is 64.
3. Change the target hostname per client so they target the SQL VM they need to target.
4. On all HammerDB client VMs, click Create Users.
5. On all HammerDB client VMs, simultaneously click Play to begin the benchmark.
6. Once the test has completed the warmup phase, navigate to the vSphere console.
7. In the vSphere console, highlight the six SQL VMs and select Migrate.
8. In Select a migration type, select Change compute resources only, and click Next.
9. In Select a compute resource, select the target host, and click Next.
10. In Select networks, leave defaults, and click Next.
11. In Select vMotion priority, leave defaults, and click Next.
12. In Ready to complete, click Finish.
13. After all VMs have finished migrating, navigate to the source host, and look in the Monitor → Tasks tab. Record the time it took to complete each vMotion.
14. Migrate each VM back to the source host to prepare for the next run.

Performing a restore after a test run

We performed the following steps on all database VMs after completing a test run.

1. Shut down the database VM.
2. Power on the database VM.
3. Use SSMS to log into the VM database.
4. Right-click the tpcc database, and select Delete.
5. In Delete Object, check Close existing connections, and click OK.
6. Right-click Databases, and select Restore Files and Filegroups.
7. In Destination to restore, type tpcc.
8. In Source for restore, select From Device.
9. In Select backup devices, navigate to F:\backup\backup.bak, and click OK.
10. Verify that the system is restoring the files to their appropriate locations, and click OK.
11. When the restore completes, click OK.
12. Complete steps 1 through 11 for the remaining database VMs.

This project was commissioned by Intel.

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How we created this report

A PT team, which includes the contributors we've listed and others, created this report and performed the technical work behind it. We used AI to generate some text for the report.



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