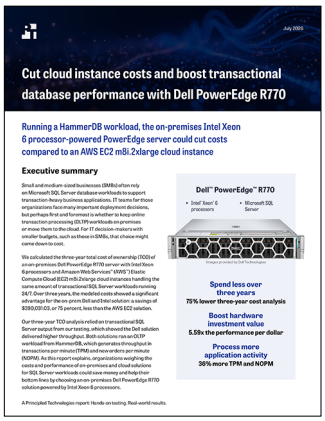

The science behind the report:

Cut cloud instance costs and boost transactional database performance with Dell PowerEdge R770

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 Cut cloud instance costs and boost transactional database performance with Dell PowerEdge R770.

We concluded our hands-on testing on June 19, 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 June 16, 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: Server/VM rack space and cost

	Amazon Web Services™ (AWS™) Elastic Cloud Compute (EC2) m8i.2xlarge	Dell™ PowerEdge™ R770	Notes
Number of servers or cloud instances required	28	1	The Dell PowerEdge R770 supported 28 VMs during testing. We ran a single AWS instance, and extrapolated cost and performance to match a 28-VM workload.
Rack units per server (u)	N/A	2	
Cost per cloud instance	$18,418.04	N/A	We assumed 100% uptime per month.
Infrastructure cost	$515,705.12	$104,164.78	The AWS cost is all-inclusive, and we used the three-year reserve pricing model for estimating costs of 28 VMs. The Dell hardware cost also includes three years of Dell ProSupport and Next Business Day Onsite Service.

Table 2: Benchmark results and equivalent performance calculations

	AWS EC2 m8i.2xlarge	Dell PowerEdge R770	Notes
Median new orders per minute (NOPM)	44,078	1,682,851	Source: Results based on PT testing. AWS performance is for a single instance, and Dell performance is for a single Dell PowerEdge R770 server running 28 VMs.
Median transactions per minute (TPM)	102,576	3,909,258	Source: Results based on PT testing. AWS performance is for a single instance, and Dell performance is for a single Dell PowerEdge R770 server running 28 VMs.
Extrapolation multiplier	28	1	
Equivalent NOPM for 28 instances or VMs	1,234,184	1,682,851	
Dell solution NOPM win (percent)		36.35%	
In-VM CPU utilization %	15.40%	25.96%	
Host CPU utilization %	N/A	53.29%	
NOPM per dollar	2.39	13.39	

Table 3: Power usage measurements

	AWS EC2 m8i.2xlarge	Dell PowerEdge R770	Notes
Power usage per server under load (watts)	N/A	868.50	Source: Power measurement during testing
Power usage per server while idle (watts)	N/A	584.25	Source: Power measurement during testing

Table 4: Power and cooling calculations

		Notes
Cost per kWh (USD)	0.1395	Avg price of electricity (all sectors) April 2026 (Rolling 12 Months Ending in April) Source: https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=table_5_03; accessed 6/25/2026.
Hours in year	8,760	24x7 data center utilization
Percentage time under load/active (remainder idle)	100.00%	We assumed 100% uptime to match our AWS assumption.
Power usage effectiveness (PUE)	1.50	We used this multiplier to add cooling cost to power cost. The capacity-weighted average PUE is 1.5. PUE is the ratio of the total power used by a computer data center facility (cooling, HVAC) to the power delivered to computing equipment. Source: https://www.statista.com/statistics/1229367/data-center-average-annual-pue-worldwide/; accessed 6/25/2026.
Cost per kilowatt hour (kWh) for power and cooling (USD)	0.2093	Calculation: Cost per kWh for power multiplied by PUE

Table 5: Power and cooling costs

	AWS EC2 m8i.2xlarge	Dell PowerEdge R770	Notes
Number of required servers	N/A	1	
Power usage under load (watts)	N/A	868.50	Calculation: Power usage under load multiplied by number of servers
Power usage while idle (watts)	N/A	584.25	Calculation: Power usage while idle multiplied by number of servers
Typical watts	N/A	868.5	Calculation: (% time active * watts-active) + (% time idle * watts-idle)
Annual kWh	N/A	7608.06	Calculation: Convert typical watts to kWh using hours in year
Total annual energy cost for power and cooling	N/A	$1,592.37	Calculation: Annual kWh multiplied by cost per kWh for power and cooling
Total three-year power and cooling cost	N/A	$4,777.11	Calculation: Annual cost multiplied by three (years)

Table 6: Data center space cost estimates

Annual data center costs per rack unit (1u)	$2,000.00	Note: PT estimate: We assumed a cost of $2,000 per year per rack unit for data center space, the rack, and networking.

Table 7: Data center space costs

	AWS EC2 m8i.2xlarge	Dell PowerEdge R770	Notes
Rack units per server (u)	N/A	2	
Rack units (u) required	N/A	2	Calculation: Number of servers multiplied by rack units per server
Annual data center space cost	N/A	$4,000.00	Calculation: Annual data center costs per rack unit multiplied by number of required rack units
Total three-year cost	N/A	$12,000.00	Calculation: Annual data center space cost multiplied by three (years)

Table 8: Hardware maintenance and administration cost calculations

		Notes
Number of servers per server admin	100	PT estimate: We assumed a large data center with automated processes.
Average salary of an administrator	$110,260.00	Annual mean wage for network and computer systems administrator, source: BLS May 2025 https://data.bls.gov/oes/#/industry/000000; accessed 6/25/2026.
Salary as percentage of total employee compensation (salary + benefits)	69.90%	Salary as a percentage of salary and benefits for private industry workers = 69.9%; benefits are 30.1%, source: BLS March 2026 https://www.bls.gov/news.release/ecec.nr0.htm; accessed 6/25/2026.
Average total employee compensation (salary + benefits)	$157,739.63	Calculation: Average salary divided by salary % of total compensation

Table 9: Hardware maintenance and administration costs

	AWS EC2 m8i.2xlarge	Dell PowerEdge R770	Notes
Number admins needed	N/A	0.01	Calculation: Total required systems divided by number of servers per IT admin (this roughly works out to 28 hrs/yr admin time assuming 2,080 hrs worked in a standard year)
Annual administration cost	N/A	$1,577.40	Calculation: Total compensation multiplied by number of admins needed for all required systems
Total 3-year administration cost	N/A	$4,732.20	Calculation: Annual cost multiplied by three years

Table 10: Total three-year costs

	AWS EC2 m8i.2xlarge	Dell PowerEdge R770	Notes	Line item savings
Infrastructure cost	$515,705.12	$104,164.78	Cost of the Dell PowerEdge R770 server including three-year Dell ProSupport with Next Business Day service.	$411,540.34
Total three-year power and cooling cost	N/A	$4,777.11	PT estimate: We assumed 100% active time.	
Total three-year datacenter space cost	N/A	$12,000.00	PT estimate: We assumed a cost of $2,000 per year per rack unit for data center space, the rack, and networking.	
Total three-year system maintenance/ administration cost	N/A	$4,732.20	PT estimate: We assumed a 1:100 ratio of IT administrators to servers.	
Total three-year costs	$515,705.12	$125,674.09		$390,031.03

Table 11: TCO summary findings

Total three-year savings for Dell PowerEdge R770	$390,031.03	
Percentage savings for Dell PowerEdge R770	75.63%	Calculation: three year savings divided by total three-year cost of AWS
AWS times more expensive than Dell solution	4.1	Total three-year cost of AWS solution divided by total three-year cost of PowerEdge R770

System configuration information

Table 12: Detailed configuration information for the server under test.

Server configuration information	Dell PowerEdge R770
Test dat	06/18/2026
BIOS name and version	Dell 1.8.5
Operating system name and version/build number	VMware® ESXi, 9.1.0 25370933
Date of last OS updates/patches applied	06/10/2026
Power management policy	Performance
Processor	
Number of processors	2
Vendor and model	Intel® Xeon® 6767P
Core count (per processor)	64
Core frequency (GHz)	2.40
Stepping	1
Hyper-Threading	Yes
Turbo	Yes
Number of vCPU per VM	8
Memory module(s)	
Total memory in system (GB)	1,024
Number of memory modules	16
Vendor and model	Micron MTC40F2046S1RC64BD2
Size (GB)	64
Type	DDR5
Speed (MHz)	6,400
Speed running in the server (MHz)	6,400
Storage controller	
Vendor and model	Dell PERC H365i Front
Cache size (GB)	0
Firmware version	8.14.0.0.15-14
Local storage	
OS	
Number of drives	2
Drive vendor and model	Dell EC NVMe® ISE 7450 RI M.2 SSD
Drive size (GB)	480
Drive information (speed, interface, type)	NVMe M.2 SSD

Server configuration information	Dell PowerEdge R770
Data disks	
Number of drives	4
Drive vendor and model	Dell DC NVMe CD8 U.2 SSD
Drive size (TB)	1.92
Drive information (speed, interface, type)	NVMe U.2 SSD
Network adapter 1	
Vendor and model	1x Intel E610-IT4
Number and type of ports	2x 2.5GbE RJ45
Firmware version	1.01
Network adapter 2	
Vendor and model	1x Intel E810-C
Number and type of ports	2x 100GbE QSFP
Firmware version	4.80
Cooling fans	
Vendor and model	Dell Silver
Number of cooling fans	6
Power supplies	
Vendor and model	DELL PWR SPLY, 1,500W, RDNT, DELTA
Number of power supplies	2

Table 13: Detailed configuration information for the VMs and AWS instance under test.

Server configuration information	On-premises 8vCPU VM	m8i.2xlarge
Tested by	Principled Technologies	Principled Technologies
Test date	06/18/2026	06/17/2026
CSP / Region	Local	us-east-2c
Workload & version	HammerDB v5.0 TPROC-C	HammerDB v5.0 TPROC-C
WL specific parameters	600 Warehouses 16 virtual users Use All Warehouses enabled	600 Warehouses 8 virtual users Use All Warehouses enabled
Iterations and result choice	3 runs, median	3 runs, median
Server platform	Dell PowerEdge R770	m8i.2xlarge
BIOS name and version	VMware, Inc. VMW201.00V.25122066. B64.251219182	Amazon EC2 1.0 10/16/2017
Operating system name and version/build number	Microsoft Windows Server 2026 Datacenter 10.0.26100 Build 26100	Microsoft Windows Server 2026 Datacenter 10.0.26100 Build 26100
Date of last OS updates/patches applied	06/15/2026	06/15/2026

Server configuration information	On-premises 8vCPU VM	m8i.2xlarge
Processor		
Vendor and model	Intel Xeon 6767P	Intel Xeon 6975P-C
Core count (per processor)	64	Not disclosed
Core frequency (GHz)	2.40	2.70
Stepping	1	1
Hyper-Threading	Yes	Yes
Turbo	Yes	Yes
Number of vCPU per VM	8	8
Memory module(s)		
Total memory in VM (GB)	32	32
NVMe memory present?	No	No
Total memory (DDR+NVMe RAM)	32	32
General HW		
Storage: NW or Direct Att / Instance	Direct Att	NW
Network BW / Instance	N/A	Up to 15 Gbps
Storage BW / Instance	N/A	Up to 10 Gbps
Local storage		
OS		
Number of drives	1	1
Drive size (GB)	60	60
Drive information (speed, interface, type)	U.2. NVMe, default IOPS and throughput	gp3, EBS, 3,000 IOPS / 125 MBps
Data drive		
Number of drives	1	1
Drive size (GB)	100	100
Drive information (speed, interface, type)	U.2. NVMe, default IOPS and throughput	gp3, EBS, 12,000 IOPS / 312 MBps
Log drive		
Number of drives	1	1
Drive size (GB)	40	40
Drive information (speed, interface, type)	U.2. NVMe, default IOPS and throughput	gp3, EBS, 12,000 IOPS / 312 MBps
Network adapter		
Vendor and model	vmxnet3 Ethernet Adapter	Amazon Elastic Network Adapter
Number and type of ports	1x 10Gb	1x 5Gb

How we tested

We installed and configured the latest available version of VMware vSphere® 9.1.0 build 25370933 on a Dell PowerEdge R770 server with Intel Xeon 6767P processors. We installed the hypervisor on internal M.2 SSDs. On the host, we created four 1.75TB VMware datastores using one CPU-attached NVMe drive for each. We distributed the Microsoft SQL Server VMs under test evenly across the four datastores.

For the Dell solution, we deployed 28 Microsoft Windows Server 2025 VMs on the host. Each VM had 8 vCPUs, 32 GB of memory, a 60GB OS drive, a 100GB data drive, and a 40GB log drive. On each VM, we installed Microsoft SQL Server 2025. For the cloud solution, we deployed a single m8i.2xlarge instance on AWS with disk capacities matching the Dell solution. To test the database performance of both environments, we used the TPROC-C workload from HammerDB 5.0. Each VM or cloud instance had a single SQL Server instance with a 60GB database.

We targeted the maximum new orders per minute (NOPM) each environment could achieve by increasing the virtual user (vu) count until performance degraded. The max vu count was 16 for the VMs on the Dell solution, and 8 for the AWS instance. We deployed two servers for HammerDB clients to drive the workload against the on-prem Dell server and used a similarly configured instance on AWS to drive the workload there. The on-prem client hosts ran 14 client VMs each. We configured each client VM with 4 vCPUs, 8 GB of memory, and 50 GB of OS storage. We deployed a controller VM to one of the on-prem client machines to orchestrate tests across the 28 pairs of SUTs and clients.

The following sections describe the steps we took to configure the test environment and run the test.

Installing vSphere version 9.1.0 build 25370933 on the Dell PowerEdge R770

1. From the VMware website, download ESXi Version 9.1.0 build 25370933.
2. Open a new browser tab, and connect to the IP address of the R770 iDRAC.
3. Log in with the iDRAC credentials.
4. In the main screen, click Launch Virtual Console.
5. In the console menu bar, select Virtual Media, and click Connect Virtual Media.
6. Under Map CD/DVD, click Browse. Navigate to the download location, and select the image you downloaded in step 1.
7. To mount the ISO image, click Map Device.
8. On the console menu bar, click the Power Control, and select Power Reset.
9. The system will boot to the mounted image and the Loading ESXi installer screen will appear. When prompted, press Enter to continue.
10. To Accept the EULA and Continue, press F11.
11. Select the storage device to target for installation. We selected the internal M.2 card. To continue, press Enter.
12. To confirm the storage target, press Enter.
13. Select the keyboard layout, and press Enter.
14. Provide a root password, and confirm the password. To continue, press Enter.
15. To install, press F11.
16. Upon completion, to reboot the server, press Enter.

Installing VMware vCenter Server Appliance version 9.1.0 build 25370922

Note: We deployed the vCenter appliance on one of the client hosts for management of the vSphere environment.

1. From the VMware website, download VMware vCenter version 9.1.0 build 25370922.
2. Mount the image on your local system, and browse to the vcsa-ui-installer folder. Expand the folder for your OS, and launch the installer if it doesn't do so automatically.
3. When the vCenter Server Installer wizard opens, click Install.
4. To begin installation of the new vCenter server appliance, click Next.
5. To accept the license agreement, check the box, and click Next.
6. Enter the IP address of the infrastructure server with VMware ESXi version 9.1.0 build 25370933. Provide the root password, and click Next.
7. To accept the SHA1 thumbprint of the server's certificate, click Yes.
8. Accept the VM name, and provide and confirm the root password for the VCSA. Click Next.
9. Set the size for environment you're planning to deploy. We selected Small. Click Next.
10. Select the datastore on which to install vCenter. Accept the datastore defaults, and click Next.
11. Enter the FQDN, IP address information, and DNS servers you want to use for the vCenter server appliance. Click Next.
12. To begin deployment, click Finish.
13. When Stage 1 has completed, click Close. To confirm, click Yes.
14. On the Getting Started - vCenter Server page, click Set up.

15. Enter the root password, and click Log in.
16. Click Next.
17. Enable SSH access, and click Next.
18. To confirm the changes, click OK.
19. Type `vsphere.local` for the Single Sign-On domain name. Enter a password for the administrator account, confirm it, and click Next.
20. Click Next.
21. Click Finish.

Creating a vSphere cluster in vCenter

1. Open a browser, and enter the address of the vCenter server you deployed. For example: `https://[vcenter.FQDN]/ui`
2. In the left panel, select the vCenter server, right-click, and select New Datacenter.
3. Provide a name for the new datacenter, and click OK.
4. Select the datacenter you just created, right-click, and select New Cluster.
5. Give a name to the cluster, and click OK.
6. In the cluster configuration panel, under Add hosts, click Add.
7. Enter the IP address and root credentials for the host. Click Next.
8. Click OK.
9. Click Next.
10. Click Finish.

Creating the gold test VM on the PowerEdge R770

1. In vCenter, select a host to create a VM.
2. Right-click, and select New Virtual Machine.
3. Click Create a new virtual machine, and click Next.
4. Enter an appropriate VM name, select Datacenter, and click Next.
5. Select an appropriate host, and click Next.
6. Choose an appropriate datastore, and click Next.
7. Select an appropriate compatibility mode (ESXi 9.0 and later), and click Next.
8. For the Guest OS Family, select Windows, and for the Guest OS Version, select Windows Server 2025 (64-bit). Click Next.
9. In Customize Hardware, select the following:
   - 8 vCPU
   - 32GB memory fully reserved
   - 60GB OS hard drive
   - 100GB data hard drive
   - 40GB log hard drive
10. Choose the appropriate VM Network, point the DVD drive to the installation media ISO in your datastore, and click Next.
11. Review, and click Finish.

Creating the gold test VM on the AWS instance

1. Log into AWS, and navigate to the AWS Management Console.
2. Click EC2.
3. Click Launch instance.
4. Name the instance, and add any desired tags.
5. Under OS images, click Windows.
6. Under the Amazon Machine Image (AMI) dropdown, select Microsoft Windows Server 2025 Base.
7. Under the Instance Type dropdown, select m8i.2xlarge.
8. In the Key pair (login) section, click Create new key pair.
9. Give the key a name, and click Create key pair.
10. Under Network settings, click Edit.
11. Select your desired Subnet and Availability Zone. We chose us-east-2c.
12. Create or select an existing security group. Ensure that there is an inbound rule for RDP.
13. Under Storage (volumes), click Advanced.
14. Expand Volume 1 (AMI Root) to 60 GiB.

15. Set Volume type to gp3.
16. To add your data volume, click Add new volume.
17. Set Volume 2 to gp3, 100 GiB, 12,000 IOPS, and 312 throughput.
18. To add your log volume, click Add new volume.
19. Set Volume 3 to gp3, 40 GiB, 12,000 IOPS, and 312 throughput.
20. Click Launch instance.

Installing Windows Server 2025 on the gold test VM

1. Attach the Windows Server 2025 ISO to the VM.
2. Open the VM console, and start the VM.
3. When the system prompts you to boot from DVD, press any key.
4. When the installation screen appears, leave language, time/currency format, and input method as default, and click Next.
5. Click Install now.
6. When the installation prompts you, enter the product key.
7. Select Windows Server 2025 Datacenter Edition, and click Next.
8. Check I accept the license terms, and click Next.
9. Click Custom: Install Windows only (advanced).
10. Select Drive 0 Unallocated Space, and click Next. This starts Windows automatically, and Windows will restart automatically after completing.
11. When the Settings page appears, fill in the Password and Reenter Password fields with the same password. Log in with the password you set up previously.
12. Install VMware Tools in the VMs hosted on the vSphere servers.
13. From Server Manager, disable Windows Firewall.
14. Run Windows Updates.

Installing Microsoft SQL Server 2025 on gold test VM

1. Attach the installation media ISO for SQL Server 2025 to the VM.
2. Click Run SETUP.EXE. If Autoplay does not begin the installation, navigate to the SQL Server 2025 DVD, and double-click it.
3. In the left pane, click Installation.
4. Click New SQL Server stand-alone installation or add features to an existing installation.
5. Specify Evaluation as the edition you are installing, and click Next.
6. To accept the license terms, click the checkbox, and click Next.
7. Click Use Microsoft Update to check for updates, and click Next.
8. At the Feature Selection screen, select Database Engine Services and Full-Text and Semantic Extractions for Search.
9. Click Next.
10. At the Instance configuration screen, leave the default selection of default instance, and click Next.
11. At the Server Configuration screen, accept defaults, and click Next.
12. At the Database Engine Configuration screen, select the authentication method you prefer. For our testing purposes, we selected Mixed Mode.
13. Enter and confirm a password for the system administrator account.
14. Click Add Current user. This may take several seconds.
15. Click Data Directories, and specify any nondefault installation directories.
16. To configure the file size, number of files, and auto-growth settings, click TempDB. We used 8x 1GB temp data files and 1x 1GB temp log file.
17. To specify your max degree of parallelism, click MaxDOP. We used 8.
18. To specify the minimum and maximum server memory values, click Memory. We set our minimum to 0 and our maximum to 29491MB (90 percent of the total memory per VM).
19. Click Next.
20. At the Ready to Install screen, click Install.
21. Once installation completes, close the installation window.
22. Download and install SQL Server Management Studio.

Locking pages in memory

1. Click Start, and type `Local Security Policy`. When the program appears in the search, open it.
2. Expand Local Policies, and click User Rights Assignment.

3. In the right pane, scroll down, and double-click Lock pages in memory.
4. Click Add User or Group, type `NT Service\MSSQLSERVER`, and click OK.
5. To close the Properties window, click OK, and close the Local Security Policy window.

Creating the gold client VM on the PowerEdge R770

1. In vCenter, select a host to create a VM.
2. Right-click, and select New Virtual Machine.
3. Click Create a new virtual machine, and click Next.
4. Enter an appropriate VM name, select Datacenter, and click Next.
5. Select an appropriate host, and click Next.
6. Choose an appropriate datastore, and click Next.
7. Select an appropriate compatibility mode (ESXi 9.0 and later), and click Next.
8. For the Guest OS Family, select Windows, and for the Guest OS Version, select Ubuntu Linux (64-bit). Click Next.
9. In Customize Hardware, select the following:
   - 4 vCPU
   - 8GB Memory fully reserved
   - 50GB OS hard drive
10. Choose appropriate VM Network, point the DVD drive to the installation media ISO in your datastore, and click Next
11. Review, and click Finish.

Creating the gold client VM on AWS

1. Log into AWS, and navigate to the AWS Management Console.
2. Click EC2.
3. Click Launch instance.
4. Name the instance, and add any desired tags.
5. Under OS images, click Browse more AMIs.
6. In the search bar, type `Ubuntu 22.04`.
7. In AWS Marketplace AMIs, select Ubuntu 22 (Ubuntu 22.04 LTS). Click Subscribe.
8. Under the Instance Type dropdown, select m6i.xlarge.
9. From the dropdown menu in the Key pair (login) section, select your previously created key.
10. Under Network settings, click Edit.
11. Select your desired Subnet and Availability Zone. We chose us-east-2c.
12. Select your previously chosen security group. Ensure that there is an inbound rule for SSH (you can also add this later).
13. Under Storage (volumes), click Advanced.
14. Expand Volume 1 (AMI Root) to 50 GiB.
15. Set Volume type to gp3
16. Click Launch instance.

Installing Ubuntu 22.04 LTS on the gold client VM

1. Ensure the Ubuntu 22.04 LTS ISO is attached to the VM.
2. Open the VM console, and start the VM.
3. Select your language of choice, and press enter.
4. Select Continue without updating, and press enter.
5. Select Done, and press enter.
6. Leave Ubuntu Server checked, select Done, and press enter.
7. Choose your networking configuration, select Done, and press enter.
8. Select Done, and press enter.
9. Select Done, and press enter.
10. Ensure Use an entire disk is selected, select Done, and press enter.
11. Confirm your file system summary, select Done, and press enter.
12. Enter your name, server name, username, password, and password confirmation. Select Done, and press enter.
13. Check Install OpenSSH server, select Done, and press enter.
14. Select Done, and press enter.
15. Once the installation is complete, press enter to reboot the VM.

Configuring Ubuntu and installing HammerDB 5.0 on the gold client VM

1. Log into the client instance via ssh.
2. Update and upgrade Ubuntu:

```
sudo apt update -y
sudo apt upgrade -y
```

3. Turn on ssh root login and password authentication:

```
echo 'PasswordAuthentication yes' > .ssh/sshd_config
echo 'PermitRootLogin yes' > .ssh/sshd_config
```

4. Install required packages:

```
sudo apt install -y wget vim tar zip unzip
```

5. Install unixODBC library:

```
sudo apt install -y unixodbc unixodbc-dev
```

6. Download and install the Microsoft Open Database Connectivity (ODBC) 18 driver for Ubuntu:

```
curl -sSL -O https://packages.microsoft.com/config/ubuntu/$(grep VERSION_ID /etc/os-release | cut -d
'"' -f 2)/packages-microsoft-prod.deb
sudo dpkg -i packages-microsoft-prod.deb
rm packages-microsoft-prod.deb
sudo apt-get update
sudo ACCEPT_EULA=Y apt-get install -y msodbcsql18
```

7. Download HammerDB 5.0 for Ubuntu:

```
sudo wget https://github.com/TPC-Council/HammerDB/releases/download/v5.0/HammerDB-5.0-Prod-
Lin-UBU22.tar.gz
```

8. Extract the HammerDB package:

```
tar -xf HammerDB-5.0-Lin-UBU22.tar.gz
```

9. Copy the tpc-c.tcl script from our Scripts we used in testing section to the HammerDB directory of the client instance.

Creating the 600-warehouse database

1. Log into the client instance via ssh.
2. Navigate to the HammerDB directory:

```
cd HammerDB-5.0
```

3. Start hammerdbcli:

```
./hammerdbcli
```

4. Set the following variables:

```
dbset db mssqls
```

```
dbset bm TPC-C
diset connection mssqls_server <IP_ADDRESS>
diset connection mssqls_authentication sql
diset connection mssqls_uid sa
diset connection mssqls_pass <password>
diset connection mssqls_tcp true
diset connection mssqls_port 1433
diset tpcc mssqls_count_ware 600
diset tpcc mssqls_use_bcp false
diset tpcc mssqls_num_vu <number of virtual users to build db>
```

5. Build the schema:

```
buildschema
```

Backing up the 600-warehouse database

1. Log into the test instance via RDP.
2. Open SQL Server Management Studio.
3. Right-click the TPROC-C database, and click Tasks→Back up….
4. Choose a location to store the backup, and click OK.

Running the tests

Note: We used a controller VM to orchestrate testing across our 28 pairs of client and test VMs for the on-prem system.

1. Log into the client instance via ssh.
2. Navigate to the HammerDB directory:
3. `cd HammerDB-5.0`
4. Use hammerdbcli to run the tpc-c.tcl script found in the Scripts we used in testing section below:
5. `./hammerdbcli auto tpc-c.tcl`
6. Log into the SQL Server VM via RDP.
7. To drop and restore the database, run the Restore-db.sql script found in the Scripts we used in testing section below.
8. Complete the test two more times. We report the median run results.

Scripts we used in testing

tpc-c.tcl

```
dbset db mssqls
dbset bm TPC-C

diset connection mssqls_server 10.220.67.202
diset connection mssqls_authentication sql
diset connection mssqls_uid sa
diset connection mssqls_pass Password1
diset connection mssqls_tcp true
diset connection mssqls_port 1433

diset tpcc mssqls_count_ware 600
diset tpcc mssqls_total_iterations 1000000000
diset tpcc mssqls_driver timed
diset tpcc mssqls_rampup 10
diset tpcc mssqls_duration 20
diset tpcc mssqls_allwarehouse true

loadscript
puts "TEST STARTED"
vuset vu 16
vuset logtotemp 1
vucreate
tcstart
tcstatus
set jobid [ vurun ]
vudestroy
tcstop
puts "TEST COMPLETE"
```

Restore-db.sql

```
USE [master]
GO
DROP DATABASE [tpcc]
GO
RESTORE DATABASE [tpcc] FROM  DISK = N'E:\backup\tpcc.bak' WITH  FILE = 1, REPLACE, NOUNLOAD,  STATS = 5
GO
```

This project was commissioned by Dell Technologies.

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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 text and edit content.

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