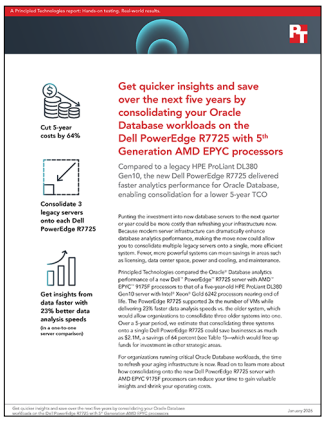

The science behind the report:

Get quicker insights and save over the next five years by consolidating your Oracle Database workloads on the Dell PowerEdge R7725 with 5th Generation AMD EPYC processors

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 Get quicker insights and save over the next five years by consolidating your Oracle Database workloads on the Dell PowerEdge R7725 with 5th Generation AMD EPYC processors.

We concluded our hands-on testing on December 8, 2025. 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 November 26, 2025 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 http://facts.pt/calculating-and-highlighting-wins. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Table 1: Results of our testing.

	Dell PowerEdge R7725	HPE ProLiant DL380 Gen10	% win for Dell running AMD EPYC
General metrics captured during testing			
VMs	6	2	300%
Time (seconds)	2,375	2,941	24%
System active power (W)	972.8	380.4	
System idle power (W)	614.8	293.8	
Active power per VM (W)	162.1	190.2	15%
Idle power per VM (W)	102.4	146.9	30%
CPU%	93.5%	79.2	
Disk (MB/s)	23,529	6,350	

	Dell PowerEdge R7725	HPE ProLiant DL380 Gen10	% win for Dell running AMD EPYC
Time to complete all queries, in seconds (5 users per VM running 22 queries each)			
Average time (seconds)	2,335	2,851	
Max time (seconds)	2,359	2,933	
Min time (seconds)	2,321	2,770	
Query time per user, in seconds (average)	82.9	103.4	
Query time per user, in seconds (max)	84.3	106.3	
Query time per user, in seconds (min)	81.5	100.4	

TCO calculations

Table 2: Testing results, power consumption, purchasing costs, and Oracle Database licensing costs and assumptions.

	HPE ProLiant DL380 Gen10	Dell PowerEdge R7725	Notes
General metrics captured during testing			
Number of VMs per server	2	6	PowerEdge R7725 tested running 3x the load of the legacy server, using 3x VMs
Physical processors per server	2	2	
Total cores per server	32	32	
Rack units per server (u)	2	2	
Cost for Dell PowerEdge R7725 rack server and Dell ProSupport and Next Business Day Onsite Service, 5-year term		$74,484.98	Based on Extended Price (Estimated) of $ 69,471.25 for PowerEdge R7725 server configured to match our test server. Quote included a 36-month term of ProSupport. We added Year 4 and 5 additional ProSupport cost for corresponding configuration in Dell Store. Server cost accessed 12/18/25; support accessed 12/11/25.
Support and services per server for legacy server	$4,353.22		We include costs for 5-year support with next day on-site service for both servers. Dell support is included in the server cost estimate above. For HP: We priced the year 6-10 support for these servers at the same prices as HPE 5-year Basic Extended service plan for an HPE ProLiant DL370 G10 server. Source: https://buy.hpe.com/us/en/search?text=HPE%205%20Year%20Tech%20Care%20Basic%20Proliant%20DL380%20Gen10%2B%20 (Accessed 12/11/2025)
Benchmark results and equivalent performance calculations			
Total number of servers required for equivalent performance based on HammerDB TPROC-H performance (rounded up to whole number)	3	1	Source: Results based on PT testing.
Total cores for all required servers	96	32	Calculation: Total number of systems times total cores per server.
Power usage measurements			
Power usage per server (Watts-load)	380.40	972.80	Source: Power measurement during testing.
Power usage per server (Watts-idle)	293.80	614.80	Source: Power measurement during testing.
Hardware costs for all required servers			
Number of servers required		1	Source: Consolidation ratio determined with testing.
PowerEdge R7725 rack server and Dell ProSupport and Next Business Day Onsite Service, 5-year term		$74,484.98	Source: See price details above.
Legacy server 5-year support estimate	$13,059.66		Support costs times the number of servers required.

	HPE ProLiant DL380 Gen10	Dell PowerEdge R7725	Notes
Licensing costs - Oracle Database Enterprise Edition (EE)			
License cost per license pack (list price)	$47,500.00		Source: Oracle Technology Global Price List dated March 1, 2025, accessed 12/2/2025: https://www.oracle.com/a/ocom/docs/corporate/pricing/technology-price-list-070617.pdf"
Annual cost for Oracle license support	$10,450.00		Source: Oracle Technology Global Price List dated March 1, 2025, accessed 12/2/2025: https://www.oracle.com/a/ocom/docs/corporate/pricing/technology-price-list-070617.pdf
5-year cost for one license pack and support (list price)	$99,750.00		Calculation: License cost plus 5-year support
Percent discount to apply	35%		Discount applies to license cost and support. We use the 35% midpoint of the range provided here for moderate deals: A typical discount off Oracle's list price for enterprise licenses varies, but large enterprises often see 50% or more off list price for major Oracle products (Databases, Middleware, etc.), especially when buying in volume or at fiscal year-end. Discounts of 60-70% are not uncommon in competitive situations. For moderate deals, 30-40% might be a baseline. Source: https://redresscompliance.com/oracle-pricing-benchmarks-and-negotiation-leverage-an-enterprise-cio-playbook/, accessed 10/2/2025.
5-year discounted cost for one license pack and support	64,837.50		Calculation: Applies the percentage discount to the list price
Oracle Database Enterprise Edition (EE) costs for all required servers			
Number license packs	48	16	Calculation: Total cores on all required systems multiplied by Oracle core processor licensing factor. Both processors have core processor licensing factor of .5. Source: Oracle Core Factor table dated May 19 2025, accessed 10/2/2025, https://www.oracle.com/contracts/docs/processor-core-factor-table-070634.pdf.
Total 5-year list cost	$4,788,000.00	$1,596,000.00	Calculation: Cost of license and 5-year support times number of license packs
Total 5-year cost (after 35% discount)	$3,112,200.00	$1,037,400.00	Calculation: 5-year discounted cost for one license pack and support times number license packs

Table 3: Oracle Linux licensing costs and assumptions per server.

	Oracle Linux Premier	Oracle Linux Premier Plus	Notes
Licensing costs - Oracle Linux (license is cost free; Oracle charges per physical CPU pair for annual support)			
Oracle Linux Support annual cost per physical processor pair	$1,399.00	$2,499.00	Oracle Linux is free to download and distribute. Source: https://www.oracle.com/linux/support/, accessed 10/3/2025. We include the cost of additional support at Premier level for the legacy servers, which have the 2VM maximum for that level; and at the higher Premier Plus level for the PowerEdge R7725, which supports 3x the load on 6VMs. Price source: https://www.oracle.com/assets/els-pricelist-070592.pdf, dated 12/1/2025 and accessed 12/3/2025.
Oracle Linux Premier 5-year cost per physical processor pair	$6,995.00	$12,495.00	Calculation: Annual cost multiplied by 5 years.
Percent discount to apply	35%	35%	Applies same discount as for Oracle Database.
Oracle Linux Premier 5-year cost per physical processor pair (after 35% discount)	$4,546.75	$8,121.75	Calculation: Multiplies discount by 5-year cost per processor pair.

Table 4: Oracle Linux licensing costs and assumptions for performance-equivalent solutions.

	3x legacy server – HPE ProLiant DL380 Gen10	Dell PowerEdge R7725	Notes
Oracle Linux licensing costs for all required systems			
Support level	Oracle Linux Premier	Oracle Linux Premier Plus	
Number licenses required	3	1	The pricing metric is per physical CPU pair, so per server in this comparison.
Total 5-year list cost	$20,985.00	$12,495.00	Calculation: 5-year list price multiplied by number licenses required.
Total 5-year cost (after 35% discount)	$13,640.25	$8,121.75	Calculation: Discounted 5-year cost multiplied by number licenses required.

Table 5: Various operating costs and assumptions for performance-equivalent solutions.

	HPE ProLiant DL380 Gen10	Dell PowerEdge R7725	Notes
Licensing costs - VMware vSphere Foundation			
VMware vSphere Foundation subscription annual cost per core	$135.00		Price is not public. Source: https://wintelguy.com/vmware-licensing-calc.pl, accessed 12/3/2025.
Total 5-year cost per core	$675.00		Calculation: Current annual cost multiplied by 5 years.
Percent discount to apply	20%		Use same assumption of 20% discount for multi-year deal as wintelguy.com. Source: https://wintelguy.com/vmware-licensing-calc.pl.

	HPE ProLiant DL380 Gen10	Dell PowerEdge R7725	Notes
VMware vSphere Foundation 5-year cost per core (after 20% discount)	$540.00		Calculation: Multiplies discount by 5-year cost per core.
VMware vSphere Foundation licensing costs for all required servers			
Number licenses required	96.00	32.00	Price is per physical core because each of the servers meets the minimum requirement of 16 licensed cores per CPU.
Total 5-year list cost	$64,800.00	$21,600.00	Calculation: 5-year list cost multiplied by number licenses required.
Total 5-year cost (after 20% discount)	$51,840.00	$17,280.00	Calculation: Discounted 5-year cost multiplied by number licenses required.
Total 5-year software cost	$3,177,680.25	$1,062,801.75	Calculation: Sum VMware and Oracle costs.
Power and cooling costs			
Cost per kWh (USD)	0.1346		Avg price of electricity (all sectors) September 2025 (rolling 12 months ending in September). Source: https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=table_5_03, accessed 12/3/2025.
Hours in year	8,760		24x7 data center utilization.
Percentage time under load/active (remainder idle)	50.00%		Assume 50% active (12 hours per day).
PUE- Multiplier to add cooling cost to power cost	1.50		Capacity-weighted average PUE = 1.5; PUE (power usage effectiveness) is the ratio of the total amount of power used by a computer data center facility (cooling, HVAC) to the power delivered to computing equipment. Source: https://www.datacenterknowledge.com/energy-power-supply/uptime-institute-data-center-industry-faces-management-crisis-amid-ai-transformation, accessed 12/3/2025.
Cost per kWh for power and cooling (USD)	0.2019		Multiplies cost per kWh for power times PUE.
Power and cooling costs for all required servers			
Number of servers required	3	1	
Power usage (Watts-active)	1,141.20	972.80	Calculation: Watts-active per server multiplied by number of servers.
Power usage (Watts-idle)	881.40	614.80	Calculation: Watts-idle per server multiplied by number of servers.
Typical watts	1,011.3	793.8	Calculation: (% time active * Watts-active) + (% time idle * Watts-idle)
Annual kWh	8,858.99	6,953.69	Calculation: Convert typical watts to kWh using hours in year.

	HPE ProLiant DL380 Gen10	Dell PowerEdge R7725	Notes
Total annual energy cost for power and cooling	$1,788.64	$1,403.96	Calculation: Annual kWh times cost per kWh for power and cooling.
Total 5-year power and cooling cost	$8,943.20	$7,019.80	Calculation: Annual cost times five years.
Data center space costs			
Annual data center costs per rack unit (1u)	$2,000.00	2	PT estimate: Assume a cost of $2,000 per year per rack unit for data center space, rack, and networking.
Data center space costs for all required servers			
Rack units per server (u)	2	2	
Rack units (u) required	6	2	Calculation: Number servers times rack units per server.
Annual data center space cost	$12,000.00	$4,000.00	Calculation: Annual data center costs per rack unit times number of rack units required.
Total 5-year cost	$60,000.00	$20,000.00	Calculation: Annual data center space cost times 5 years.
Maintenance/administration costs			
Number of servers per server admin	100		PT estimate. Assumes a large data center with automated processes.
Average salary of an administrator	$101,190.00		Annual mean wage for network and computer systems administrator, BLS May 2024 https://data.bls.gov/oes/#/industry/000000, accessed 12/3/2025.
Salary as percentage of total employee compensation (salary + benefits)	70.20%		Salary as a percentage of salary and benefits for private industry workers = 70.2%; benefits are 29.8%, Source: BLS Sept 2025 https://www.bls.gov/news.release/ecec.nr0.htm, accessed 12/3/2025.
Average total employee compensation (salary plus benefits)	$144,145.30		Calculation: Average salary / salary % of total compensation.
Maintenance/administration costs for all required servers			
Number admins needed	0.03	0.01	Calculation: Total required systems divided by number of servers per IT admin.
Annual administration cost	$4,324.36	$1,441.46	Calculation:Total compensation multiplied by number admins needed for all required systems.
Total 5-year administration cost	$21,621.80	$7,207.30	Calculation: Annual cost times 5 years.

	HPE ProLiant DL380 Gen10	Dell PowerEdge R7725	Notes
Total 5-year costs, in summary			
Hardware purchase		$74,484.98	Cost of the PowerEdge R7725 including 5-year ProSupport with Next Business Day service; no purchase price for the legacy servers.
5-year hardware support for Legacy servers	$13,059.66		Estimated 5-year support cost with next business day on-site service for legacy servers. Support cost included in PowerEdge R7725 cost above.
Total 5-year software cost (after discounts)	$3,177,680.25	$1,062,801.75	Oracle DB, Oracle Linux, and VMware vSphere Foundation
Total 5-year power and cooling cost	$8,943.20	$7,019.80	PT estimate based on 50% active time.
Total 5-year datacenter space cost	$60,000.00	$20,000.00	PT estimate: Assume a cost of $2,000 per year per rack unit for data center space, rack, and networking.
Total 5-year system maintenance/ administration cost	$21,621.80	$7,207.30	PT estimate based on 1:100 ratio of IT administrators to servers.
Total 5-year costs	**$3,281,304.91**	**$1,171,513.83**	Sum of above
Findings			
Total 5-year savings for 1x PowerEdge R7725		**$2,109,791.08**	
Percentage savings	**64.29%**	Calculation: 5-year savings/total 5-year cost of legacy systems	
Multiplier (legacy solution is x.xx more expensive than PowerEdge R7725)	**2.8**	Total 5-year cost of legacy solution divided by total 5-year cost of PowerEdge R7725	

System configuration information

Table 1: Detailed information on the systems we tested.

System configuration information	Dell™ PowerEdge™ R7725	HPE ProLiant DL380 Gen10
BIOS name and version	Dell 1.3.3	HPE U30 v3.50
Non-default BIOS settings	System Profile set to Performance	Static High Performance Mode, Maximum Performance
Operating system name and version/build number	VMware® ESXi™ 9.0.0.0.24755229 Dell Customized	VMware ESXi 9.0.0.0.24755229 HPE Customized
Date of last OS updates/patches applied	June 26, 2025	June 26, 2025
Power management policy	System Profile set to Performance	Maximum Performance
Processor		
Number of processors	2	2
Vendor and model	AMD EPYC™ 9175F	Intel® Xeon® Gold 6242
Core count (per processor)	16	16
Core frequency (GHz)	4.2	2.80
Family/model/stepping	26 / 2 / 1	1
Memory module(s)		
Total memory in system (GB)	1,536	384
Number of memory modules	24	12
Vendor and model	Hynix®HMCG94AHBRA480N	Samsung® M393A4K40CB2-CVF
Size (GB)	64	32
Type	PC5-51200	PC4-23400
Speed (MHz)	6,400	2,933
Speed running in the server (MHz)	6,400	2,933
Storage controller		
Vendor and model	PERC H965i Front (Embedded)	HPE Smart Array P408i-a SR Gen10
Cache size (GB)	8	2
Firmware version	8.8.0.0.18-26	7.43
Local storage (type A)		
Number of drives	8	8
Drive vendor and model	Dell NVMe™ ISE PS1030 MU U.2	Toshiba® PX05SVB096Y
Drive size	1.6 TB	960 GB
Drive information (speed, interface, type)	PCIe® gen4 x4 (running at x2), NVMe, SSD	12Gbps, SAS, SSD

System configuration information	Dell™ PowerEdge™ R7725	HPE ProLiant DL380 Gen10
Network adapter 1		
Vendor and model	Broadcom NetXtreme-E P2100D BCM57508 2x100G QSFP PCIE Ethernet	Broadcom Corporation NetXtreme BCM5719 Gigabit Ethernet
Number and type of ports	2x 100Gb	4x 1Gb
Driver version	233.0.196.0 / pkg 23.31.18.10	bc 1.60 ncsi 1.5.61.0
Network adapter 2		
Vendor and model	Broadcom NetXtreme E-Series Quad-port 25Gb OCP 3.0 Ethernet Adapter	Intel® Ethernet Controller E810-XXV for SFP
Number and type of ports	4x 25Gb	2x 25Gb
Driver version	233.0.196.0 / pkg 23.31.18.10	4.71 0x80020038 1.3755.0
Power supplies		
Vendor and model	LITEON 01PKMHA00 (FW: 1308)	HP 865414-B21 (FW: 1.00)
Number of power supplies	2	2
Wattage of each (W)	1,500	800

How we tested

In our tests, we compared the following dual-socket solutions:

- Dell PowerEdge R7725 with AMD EPYC 9175F 16-core processors and 1,536GB DDR5 memory
  - PERC 12 storage controller (PERC H965i)
- HPE ProLiant DL380 Gen10 with Intel Xeon Gold 6242 16-core processors and 384GB DDR4 memory
  - HPE P408i storage controller

Both servers used eight SSDs in 4x RAID1 pairs to host the Oracle Database data and logs. We used VMware vSphere 9.0 as our hypervisor. On the HPE ProLiant DL380 Gen10 we created two VMs, each with 16 vCPUs and 160 GB of memory. On the Dell PowerEdge R7725, we created six VMs, each with 10 vCPUs and 160 GB of memory. We installed Oracle Linux 9.6 and Oracle Database 19c (with RU29 patches). We ran the HammerDB 5.0 TPROC-H workload with a scale 100 database and standard query set (22 queries total). We measured the total elapsed time to complete all query sets on every VM determine performance, and also recorded the min/max/average/geomean query time to verify consistency.

Installing VMware vSphere 9

1. Boot to the VMware vSphere 9 installation media.
2. To continue, press Enter.
3. To accept the license agreement, press F11.
4. Select the installation location.
5. Select a language, and create the root password.
6. To install, press F11.

Creating the base VM

1. Use a web browser to connect and log into the vSphere instance.
2. Right-click the host, and click New VM.
3. Assign the VM the following properties:
   - 10 or 16 virtual CPUs
   - 160 GB of memory
   - 80GB VMDK on SCSI controller 0 (for operating system)
   - 30GB VMDK on SCSI controller 1 (for Oracle logs)
   - 4x 50GB VMDK on NVMe controller 0-3 (for Oracle data) spread across the 4x RAID1 volumes
4. Click Finish.

Installing Oracle Linux 9.6

1. Boot the VM to the Oracle Linux 9.6 installation media.
2. Select Install or upgrade an existing system.
3. Choose English, and click Continue.
4. Under Installation Destination, select the OS VMDK to install the OS.
5. Click Done.
6. Click Accept Changes.
7. Select Kdump.
8. Uncheck Enable kdump, and click Done.
9. Select Network & Hostname.
10. Enter the desired hostname for the system.
11. Turn on the desired network ports, and click Configure.
12. On the General tab, select Automatically connect to this network when it is available.
13. On the IPv4 Settings tab, choose the Method drop-down named menu, and select Manual.
14. Under Addresses, click Add, and enter the desired static IP information for the server.
15. Enter the desired DNS information.
16. Click Save, and click Done.
17. Select Date & Time, and ensure the correct date, time, and time zone are set.

18. To add your NTP server, click the cog next to the Network Time On/Off switch.
19. Add the IP address of your NTP server, and click +.
20. Uncheck all other NTP servers.
21. Click OK.
22. Click Done.
23. Click Software Selection.
24. Choose the Base Environment of Minimal Install.
25. Click Done.
26. Click Begin Installation.
27. Select Root Password.
28. Enter the desired root password, and click Done.
29. When the installation completes, select Reboot to restart the server.

Configuring Oracle Linux 9.6 for Oracle Database

1. Log onto the server as root.
2. Configure hostname in /etc/hosts (must be a valid NIC address, not localhost, and resolve to the VM hostname):

```
echo '10.218.42.196 ol9u6.test.local ol9u6' >> /etc/hosts
echo '100.67.141.196 ol9u6.test.local ol9u6' >> /etc/hosts
```

3. Disable the firewall:

```
systemctl disable --now firewalld
```

4. Disable SELinux:

```
sed -i 's/^SELINUX=.*/SELINUX=disabled/g' /etc/selinux/config
```

5. Disable auditd:

```
systemctl disable auditd
```

6. Set Transparent Huge Pages to madvise and reboot:

```
grubby --update-kernel=ALL --args='transparent_hugepage=madvise'
```

7. Install wget, sysstat, and vim:

```
dnf install -y sysstat wget vim
```

8. Enable Add-on repo:

```
dnf config-manager --enable ol9_addons
```

9. Update Oracle Linux 9.6:

```
dnf update -y
```

10. Reboot.
11. After reboot, install the Oracle preinstall package for 19c:

```
dnf install -y oracle-database-preinstall-19c
```

12. Install additional packages for Oracle client support:

```
dnf install -y libnsl libnsl.i686 libnsl2 libnsl2.i686
```

13. Create groups for ASM by running these shell commands:

```
groupadd -g 54327 asmdba
groupadd -g 54328 asmoper
groupadd -g 54329 asmadmin
```

14. Modify the oracle user to add the ASM groups:

```
usermod -G asmdba,asmoper,asmadmin -a oracle
```

15. Grant the oracle user sudo root access:

```
echo "oracle ALL=(ALL:ALL) ALL" | sudo tee /etc/sudoers.d/oracle
sudo chmod 640 /etc/sudoers.d/oracle
```

16. Create a password for the oracle account with passwd:

```
passwd oracle
```

17. Create the following directories, and assign the following permissions:

```
mkdir -p /u01/app/19.0.0.0/grid
mkdir -p /u01/app/oracle/product/19.0.0.0/dbhome_1
chown -R oracle:oinstall /u01
chmod -R 775 /u01/
```

18. Run the following command to append the following to the /etc/security/limits.conf:

```
sudo tee -a /etc/security/limits.conf > /dev/null << EOF
oracle - nofile 65536
oracle - nproc 16384
oracle - stack 32768
oracle - memlock 4500000
soft memlock unlimited
hard memlock unlimited
EOF
```

19. Log into the oracle user:

```
su - oracle
```

20. Run the following command to append values to .bash_profile:

```
cat >> ~/.bash_profile << EOF
export TMP=/tmp
export TMPDIR=\$TMP
export ORACLE_HOSTNAME=$(hostname)
export ORACLE_UNQNAME=orcl
export ORACLE_BASE=/u01/app/oracle
export GRID_HOME=/u01/app/19.0.0.0/grid
export DB_HOME=\$ORACLE_BASE/product/19.0.0.0/dbhome_1
export ORACLE_HOME=\$DB_HOME
export ORACLE_SID=orcl
export ORACLE_TERM=xterm
```

```
export BASE_PATH=/usr/sbin:\$PATH
export PATH=\$ORACLE_HOME/bin:\$BASE_PATH
export LD_LIBRARY_PATH=\$ORACLE_HOME/lib:/lib:/usr/lib
export CLASSPATH=\$ORACLE_HOME/JRE:\$ORACLE_HOME/jlib:\$ORACLE_HOME/rdbms/jlib
alias grid_env='. /home/oracle/grid_env'
alias db_env='. /home/oracle/db_env'
EOF
```

21. Run the following commands in the oracle user's home folder:

```
cat > grid_env << EOF
export ORACLE_SID=+ASM
export ORACLE_HOME=\$GRID_HOME
export PATH=\$ORACLE_HOME/bin:\$BASE_PATH
export LD_LIBRARY_PATH=\$ORACLE_HOME/lib:/lib:/usr/lib
export CLASSPATH=\$ORACLE_HOME/JRE:\$ORACLE_HOME/jlib:\$ORACLE_HOME/rdbms/jlib
EOF
cat > db_env << EOF
export ORACLE_SID=orcl
export ORACLE_HOME=\$DB_HOME
export PATH=\$ORACLE_HOME/bin:\$BASE_PATH
export LD_LIBRARY_PATH=\$ORACLE_HOME/lib:/lib:/usr/lib
export CLASSPATH=\$ORACLE_HOME/JRE:\$ORACLE_HOME/jlib:\$ORACLE_HOME/rdbms/jlib
EOF
```

22. Log in as root.
23. From the directory you copied the packages to (in our example /install), install the Oracle ASM lib and support packages (or download from https://www.oracle.com/linux/downloads/linux-asmlib-v9-downloads.html):

```
dnf install -y oracleasm-support
dnf localinstall -y /install/oracleasmlib-*el9*
```

24. Run the following command to initialize Oracle ASM:

```
oracleasm configure -u oracle -g oinstall -s y
systemctl enable oracleasm
systemctl restart oracleasm
oracleasm init
```

25. Determine the correct disks for ASM:

```
lsblk
```

26. Create a partition on all disks. Example:

```
parted -s /dev/sdb mklabel gpt mkpart primary 1m 100%
parted -s /dev/nvme0n0 mklabel gpt mkpart primary 1m 100%
parted -s /dev/nvme1n0 mklabel gpt mkpart primary 1m 100%
parted -s /dev/nvme2n0 mklabel gpt mkpart primary 1m 100%
parted -s /dev/nvme3n0 mklabel gpt mkpart primary 1m 100%
```

27. Run the following commands to configure the disks for Oracle ASM (example):

```
oracleasm createdisk LOG1 /dev/sdb1
oracleasm createdisk DATA1 /dev/nvme0n0
oracleasm createdisk DATA2 /dev/nvme1n0
oracleasm createdisk DATA3 /dev/nvme2n0
oracleasm createdisk DATA4 /dev/nvme3n0
oracleasm listdisks
```

Installing Oracle Grid Infrastructure 19c

1. Log in directly to the oracle user with X display authentication. Example:

```
ssh -Y oracle@192.168.0.201
```

2. Extract the RU29 Grid Infrastructure patch:

```
unzip -q -o /install/p38291812_190000_Linux-x86-64.zip -d /u01/patch
```

3. Extract the RU29 OJVM patch:

```
unzip -q -o /install/p38194382_190000_Linux-x86-64.zip -d /u01/patch
```

4. Set the Oracle grid environment and change to the grid home directory:

```
grid_env
cd $ORACLE_HOME
```

5. Unzip linuxx64_193000_grid_home.zip.

```
unzip -q /install/LINUX.X64_193000_grid_home.zip
```

6. Unzip the OPatch update:

```
rm -rf OPatch
unzip -q /install/p6880880_190000_Linux-x86-64.zip
```

7. Run the following to install the CVU package that was extracted:

```
sudo dnf localinstall -y /u01/app/19.0.0.0/grid/cv/rpm/cvuqdisk-1.0.10-1.rpm
```

8. Run the following to fix OEL9 compatibility:

```
export CV_ASSUME_DISTID=OEL9
```

9. Run the following to install the latest RU (Release Update) patch:

```
./gridSetup.sh -silent -applyRU /u01/patch/38291812 -applyOneOffs /u01/patch/38194382
```

10. Run the following to begin installation of Grid Infrastructure:

```
./gridSetup.sh -silent \
INVENTORY_LOCATION=/u01/app/oraInventory \
SELECTED_LANGUAGES=en \
ORACLE_BASE=$ORACLE_BASE \
oracle.install.option=HA_CONFIG \
oracle.install.asm.OSDBA=asmdba \
oracle.install.asm.OSOPER=asmoper \
oracle.install.asm.OSASM=asmadmin \
oracle.install.crs.config.autoConfigureClusterNodeVIP=false \
oracle.install.asm.diskGroup.name=DATA \
oracle.install.asm.diskGroup.redundancy=EXTERNAL \
oracle.install.asm.diskGroup.diskDiscoveryString=ORCL:* \
oracle.install.asm.diskGroup.disks=ORCL:DATA1,ORCL:DATA2,ORCL:DATA3,ORCL:DATA4 \
oracle.install.asm.SYSASMPassword=Password1! \
```

```
oracle.install.asm.monitorPassword=Password1! \
oracle.install.crs.rootconfig.executeRootScript=true \
oracle.install.crs.rootconfig.configMethod=SUDO \
oracle.install.crs.rootconfig.sudoPath=/usr/bin/sudo \
oracle.install.crs.rootconfig.sudoUserName=oracle \
-ignorePrereqFailure
```

11. Run the following commands to configure the ASM disk groups:

```
asmca -silent -editDiskGroupAttributes -diskGroupName DATA -attribute compatible.rdbms=19.0.0.0
asmca -silent -createDiskGroup -diskGroupName LOG -disk ORCL:LOG1 -redundancy EXTERNAL
-compatible.rdbms 19.0.0.0
```

Installing Oracle Database 19c

1. To set up the Oracle database environment, type `db_env`
2. Log in directly to the oracle user. Example:

```
ssh -Y oracle@192.168.0.201
```

3. Extract the RU29 Database 19c patch:

```
unzip -q -o /install/p38298204_190000_Linux-x86-64.zip -d /u01/patch
```

4. Extract the RU29 OJVM patch (this may already be extracted during the Grid install):

```
unzip -q -o /install/p38194382_190000_Linux-x86-64.zip -d /u01/patch
```

5. Set the Oracle database environment and change to the database home directory:

```
db_env
cd $ORACLE_HOME
```

6. Unzip LINUX.X64_193000_db_home.zip.

```
unzip -q /install/LINUX.X64_193000_db_home.zip
```

7. Unzip the OPatch update:

```
rm -rf OPatch
unzip -q /install/p6880880_190000_Linux-x86-64.zip
```

8. Run the following to fix OEL9 compatibility:

```
export CV_ASSUME_DISTID=OEL9
```

9. Run the following to install the latest RU (Release Update) patch:

```
./runInstaller -silent -applyRU /u01/patch/38298204 -applyOneOffs /u01/patch/38194382
```

10. Run the following to install the Oracle Database 19c software:

```
./runInstaller -ignorePrereq -waitforcompletion -silent \
oracle.install.option=INSTALL_DB_SWONLY \
```

```
UNIX_GROUP_NAME=oinstall \
INVENTORY_LOCATION=/u01/app/oraInventory \
ORACLE_BASE=${ORACLE_BASE} \
oracle.install.db.InstallEdition=EE                                    \
oracle.install.db.OSDBA_GROUP=dba \
oracle.install.db.OSOPER_GROUP=oper \
oracle.install.db.OSBACKUPDBA_GROUP=backupdba \
oracle.install.db.OSDGDBA_GROUP=dgdba \
oracle.install.db.OSKMDBA_GROUP=kmdba \
oracle.install.db.OSRACDBA_GROUP=racdba \
oracle.install.db.rootconfig.executeRootScript=true \
oracle.install.db.rootconfig.configMethod=SUDO \
oracle.install.db.rootconfig.sudoPath=/usr/bin/sudo \
oracle.install.db.rootconfig.sudoUserName=oracle
```

Creating and configuring the database

1. Run the following to create the Oracle Database instance using the Data Warehouse template (this may take a while):

```
dbca -silent -createDatabase \
-templateName Data_Warehouse.dbc \
-gdbname ${ORACLE_SID} \
-sid ${ORACLE_SID} \
-characterSet AL32UTF8 \
-sysPassword Password1! \
-systemPassword Password1! \
-databaseConfigType SINGLE \
-databaseType DATA_WAREHOUSING \
-createAsContainerDatabase false \
-recoveryAreaDestination +DATA \
-storageType ASM \
-datafileDestination +DATA/{DB_UNIQUE_NAME}/ \
-asmsnmpPassword Password1! \
-recoveryGroupName +DATA \
-memoryMgmtType AUTO_SGA \
-memoryPercentage 80 \
-sampleSchema false \
-emConfiguration DBEXPRESS \
-dbsnmpPassword Password1! \
-emPassword Password1! \
-listeners LISTENER \
```

Configuring Oracle tablespaces, redo log, and tuning for TPROC-H

Alter the tablespaces on both systems as shown below. Type sqlplus / as sysdba to enter SQL prompt.

```
ALTER DATABASE ADD LOGFILE GROUP 11 ( '/tmp/temp1.log' ) SIZE 50M;
ALTER DATABASE ADD LOGFILE GROUP 12 ( '/tmp/temp2.log' ) SIZE 50M;
```

```
ALTER SYSTEM SWITCH LOGFILE;
ALTER SYSTEM SWITCH LOGFILE;
ALTER SYSTEM CHECKPOINT;

ALTER DATABASE DROP LOGFILE GROUP 1;
ALTER DATABASE DROP LOGFILE GROUP 2;
ALTER DATABASE DROP LOGFILE GROUP 3;

ALTER SYSTEM SWITCH LOGFILE;
ALTER SYSTEM SWITCH LOGFILE;
ALTER SYSTEM CHECKPOINT;

alter system set "_disk_sector_size_override"=TRUE scope=both;
```

```
ALTER DATABASE ADD LOGFILE GROUP 1 ( '+LOG/redo01.log' ) SIZE 10G
BLOCKSIZE 4K;
ALTER DATABASE ADD LOGFILE GROUP 2 ( '0/redo02.log' ) SIZE 10G
BLOCKSIZE 4K;

ALTER SYSTEM SWITCH LOGFILE;
ALTER SYSTEM SWITCH LOGFILE;
ALTER SYSTEM CHECKPOINT;

ALTER DATABASE DROP LOGFILE GROUP 11;
ALTER DATABASE DROP LOGFILE GROUP 12;

SHUTDOWN

STARTUP

HOST rm -f /tmp/temp*.log

CREATE BIGFILE TABLESPACE "TPCHTAB"
DATAFILE '+DATA' SIZE 150G AUTOEXTEND ON NEXT 1G
BLOCKSIZE 8K
EXTENT MANAGEMENT LOCAL AUTOALLOCATE
SEGMENT SPACE MANAGEMENT AUTO;

alter system set optimizer_dynamic_sampling=4 scope=both;
EXEC DBMS_AUTO_TASK_ADMIN.DISABLE(client_name => 'auto optimizer stats collection',operation   => NULL,
window_name => NULL);
```

Installing HammerDB

1. Log onto the server as the Oracle user.
2. Download the tarball of the latest version of HammerDB:

```
wget https://github.com/TPC-Council/HammerDB/releases/download/v5.0/HammerDB-5.0-Prod-
Lin-RHEL9.tar.gz
```

3. Extract the HammerDB tarball:

```
tar -xf HammerDB-5.0-Prod-Lin-RHEL9.tar.gz
```

Building the TPROC-H schema

1. Log onto the HammerDB client as the Oracle user.
2. Set the Oracle database environment and change to the database home directory:

```
db_env
```

3. Change directories into the HammerDB directory:

```
cd HammerDB-5.0
```

4. Switch to the HammerDB command line interface:

```
./hammerdbcli
```

5. Change the following settings in the build script:

```
dbset db ora
dbset bm TPROC-H
diset connection system_user system
diset connection system_password Password1!
diset connection instance ORCL
diset tpch scale_fact 100
diset tpch num_tpch_threads 10
diset tpch tpch_user tpch
diset tpch tpch_pass tpch
diset tpch tpch_def_tab tpchtab
diset tpch tpch_def_temp temp
```

6. Build the schema:

```
buildschema
```

7. After the build is finished, destroy the virtual users:

```
vudestroy
```

Running the TPROC-H test

1. Log onto the HammerDB client as the root user.
2. Change directories into the HammerDB directory:

```
cd HammerDB-5.0
```

3. Switch to the HammerDB command line interface:

```
./hammerdbcli
```

4. Change the following settings in the load script:

```
dbset db ora
dbset bm TPROC-H
diset connection system_user system
diset connection system_password Password1!
diset connection instance ORCL
diset tpch scale_fact 100
diset tpch num_tpch_threads 1
diset tpch tpch_user tpch
diset tpch tpch_pass tpch
diset tpch tpch_def_tab tpchtab
diset tpch tpch_def_temp temp
diset tpch total_querysets 1
diset tpch degree_of_parallel 4

loadscript
```

5. Create the virtual users:

```
vuset vu 5
vuset showoutput 1
vuset logtotemp 1
vuset unique 1
```

6. Run the test:

```
vurun
```

7. When the test is complete, record the elapsed time and geomean query time, and delete the virtual users:

```
vudestroy
```

8. Repeat steps 1 through 7 two more times for a total of three runs.

Read the report ▶

This project was commissioned by Dell Technologies.

Principled Technologies®

Facts matter.®