The science behind the report:

Achieve faster analytics performance and better energy efficiency on Dell PowerEdge R7625 servers powered by AMD EPYC 9654 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 Achieve faster analytics performance and better energy efficiency on Dell PowerEdge R7625 servers powered by AMD EPYC 9654 processors.

We concluded our hands-on testing on October 5, 2024. 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 October 5, 2024 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™ R7625	HPE ProLiant DL380 Gen10
Number of VMs	38	6
Time-to-complete all VMs (seconds)	355	441
Average power usage (W)	1,188	438
Avg CPU Utilization (%)	78.3	77.6
Number of times all-VM analysis performed in 1 hour	385	48
Total server perf/watt	0.334	0.111

Figures 1 and 2 show the average processor utilization for each server during the TPROC-H tests. Note that the time (in seconds) differs because the servers completed query sets at different times.

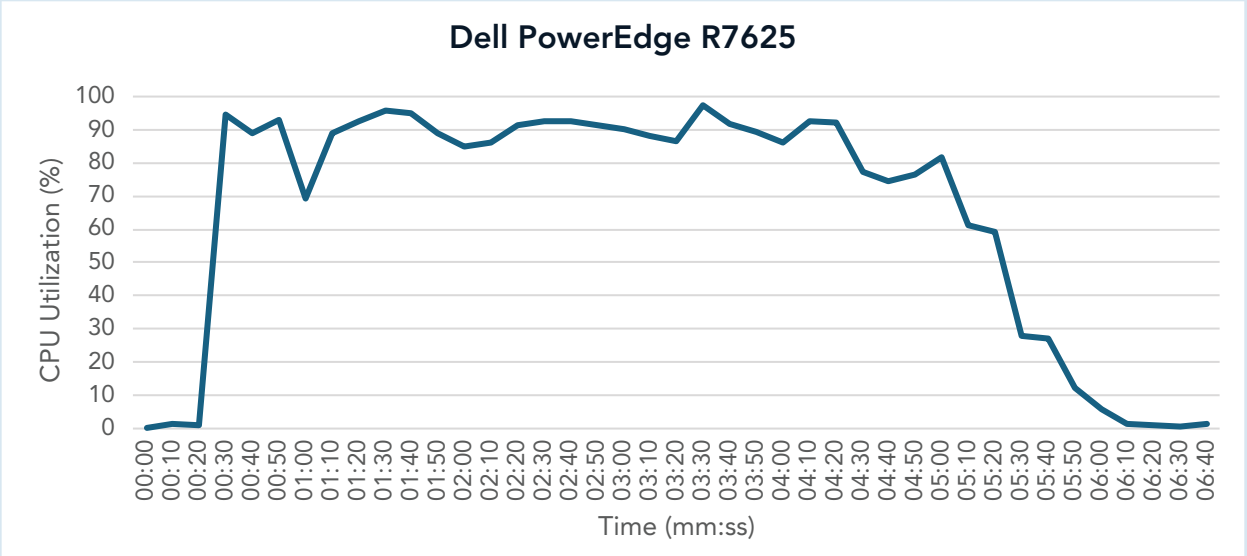

Figure 1: CPU utilization for the Dell PowerEdge R7625 server over the course of the TPROC-H test. Source: Principled Technologies.

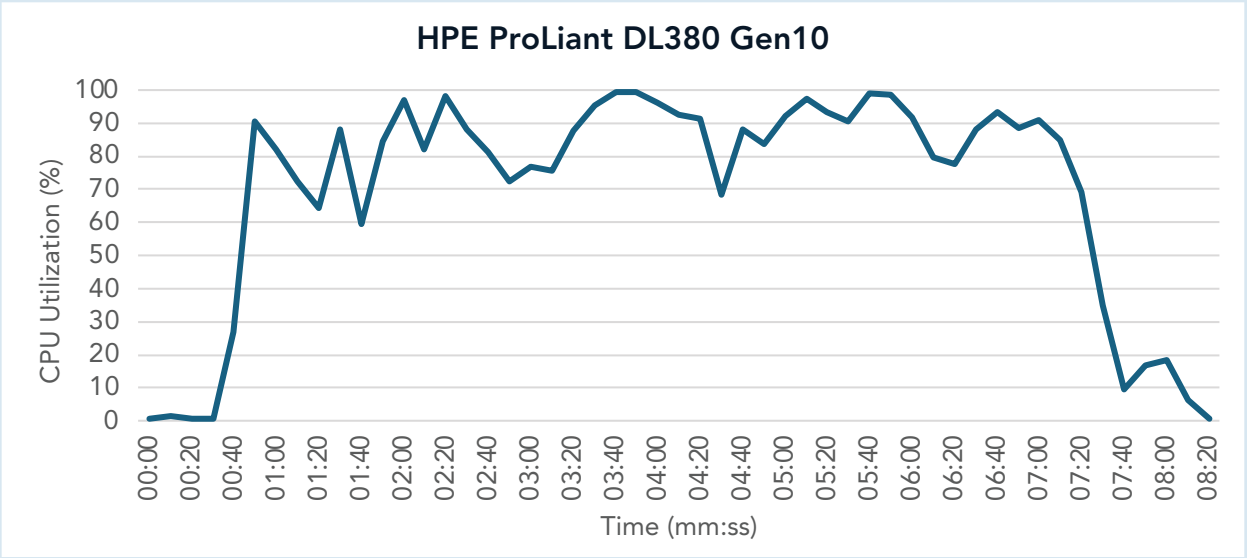

Figure 2: CPU utilization for the HPE ProLiant DL380 Gen10 server over the course of the TPROC-H test. Source: Principled Technologies.

System configuration information

Table 2: Detailed information on the systems we tested.

Server configuration information	Dell PowerEdge R7625	HPE ProLiant DL380 Gen10
BIOS name and version	Dell 1.7.2	HPE U30 v3.10
Non-default BIOS settings	System profile set to Performance	Static High Performance Mode, Maximum Performance
Operating system name and version/ build number	VMware® ESXi™ 8.0.2 23305546	VMware ESXi 8.0.2 23305546
Date of last OS updates/patches applied	June 5, 2024	July 3, 2024
Power management policy	System Profile set to Performance	Static High Performance Mode, Maximum Performance
Processor		
Number of processors	2	2
Vendor and model	AMD EPYC™ 9654	Intel® Xeon® Gold 6142
Core count (per processor)	96	16
Core frequency (GHz)	2.4	2.60
Stepping	1	1
Memory module(s)		
Total memory in system (GB)	1536	256
Number of memory modules	24	12
Vendor and model	Micron® MTC40F2046S1RC48BA1	Micron 18ASF2G72PDZ-2G6D1
Size (GB)	64	16
Type	PC5-38400	PC4-25600
Speed (MHz)	4,800	2,666
Speed running in the server (MHz)	4,800	2,666
Storage controller		
Vendor and model	BOSS-N1 Monolithic	HPE Smart Array P408i-a SR Gen10
Cache size (GB)	0 MB	2 GB
Firmware version	2.1.13.2025	6.52
Local storage		
Number of drives	16	8
Drive vendor and model	Dell NVMe™ PM1745	HPE VK000960GWCFF
Drive size (GB)	3.2 TB	960 GB
Drive information (speed, interface, type)	PCIe® SSD NVMe	6Gbps SATA SSD
Network adapter #1		
Vendor and model	Broadcom NetXtreme® Gigabit Ethernet (BCM5720)	HPE Ethernet 1Gb 4-port 331i Adapter
Number and type of ports	2 x 1Gb	4 x 1Gb
Driver version	22.71.3	20.18.31

Server configuration information	Dell PowerEdge R7625	HPE ProLiant DL380 Gen10
Network adapter #2		
Vendor and model	Mellanox ConnectX-5 EN 25GbE Dual-port SFP28 Adapter	Intel 25GbE 2P XXV710 Adapter
Number and type of ports	2x25GbE	2x25GbE
Driver version	16.27.61.20	20.5.13
Power supplies		
Vendor and model	DELL 0CYHHJA04 and 01CW9GA03	HP 5WBXUV2LL492TL
Number of power supplies	1 of each model above	2
Wattage of each (W)	1,400	800

About our testing

Our testing compared the following dual-socket solutions:

- Dell PowerEdge R7625 with AMD EPYC 9654 32-core processors and 1.5TB DDR5 memory
- HPE ProLiant DL380 Gen10 with Intel Xeon Gold 6142 16-core processors and 256GB DDR4 memory

We used VMware vSphere 8.0 as our hypervisor. We created 6 and 38 VMs on the HPE and Dell, respectively, with 10 vCPU each. We sized the memory on each VM to use up the memory on the host, leaving a few GB for hypervisor overhead. We installed Ubuntu 22.04 and PostgreSQL 16. We ran the HammerDB 4.11 TPROC-H workload, and report the time it took for the longest query to complete.

How we tested

Installing VMware vSphere 8

1. Boot to the VMware vSphere 8 installation media.
2. To continue, press Enter.
3. To accept the license agreement, press F11.
4. Select the OS 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 virtual CPU
   - 42GB memory on HPE, 40GB memory on Dell
   - 100GB VMDK
   - Thick-provisioned
   - VMware Paravirtual controller
4. Click Finish.

Installing the OS

1. Boot the VM to the Ubuntu Server 22.04 LTS installation media.
2. When prompted, select Install Ubuntu.
3. Select the desired language, and click Done.
4. Choose a keyboard layout, and click Done.
5. At the Network Connections screen, click Done.
6. At the Configure Proxy screen, click Done.
7. At the Configure Ubuntu Archive Mirror screen, click Done.
8. Select Use an entire disk, and click Done.
9. Click Continue.
10. Enter user account details, and click Done.
11. Enable OpenSSH Server install, and click Done.
12. At the installation summary screen, click Done.
13. When the installation finishes, unmount the installation media, and reboot the VM.

Configuring the OS

1. Boot the VM to the operating system, and log in with the configured user.
2. Update the system:

```
apt update -y
```

3. Upgrade the system:

```
apt upgrade -y
```

4. Install `tuned` and apply the `PostgreSQL` profile:

```
apt install -y tuned
tuned-adm profile postgresql
```

Installing and configuring PostgreSQL

1. Install PostgreSQL 16:

```
apt install -y postgresql
```

2. Edit `/etc/postgresql/16/main/postgresql.conf` to the following:

```
max_parallel_workers = 8
```

3. Restart the service:

```
systemctl restart postgresql
```

Installing HammerDB 4.11 and building the database

1. Download and extract the HammerDB files:

```
wget https://github.com/TPC-Council/HammerDB/releases/download/v4.11/HammerDB-4.11-Linux.tar.gz
tar -zxf HammerDB*
```

2. Navigate to the HammerDB-4.11 folder, and run the `pg_tproch_build.tcl` script from the Scripts section:

```
cd HammerDB-4.11
./hammerdbcli auto pg_tproch_build.tcl
```

Backing up and restoring the database

1. Stop the PostgreSQL service:

```
systemctl stop postgresql
```

2. Create an archive of the data folder:

```
sudo tar -cf- /var/lib/postgresql/16/main | pigz -9 -c > backup.tar.gz
```

3. Restore the database from the backup before every test run:

```
systemctl stop postgresql
rm -rf /var/lib/postgresql/16/main
tar -zxf backup.tar.gz -C /
systemctl start postgresql
```

Running the test

1. Use the steps above to restore a fresh copy of the database.
2. Shut down the VMs, reboot the host, start the VMs, and allow them to idle for 5 minutes.
3. Navigate to the HammerDB folder, and run the test script from the Scripts section:

```
cd HammerDB-4.11
./hammerdbcli auto pg_tproch_run.tcl
```

4. Repeat three times, and record the median score.

Scripts

pg_tproch_build.tcl

```
dbset db pg
dbset bm TPC-H
diset connection pg_host <IP_ADDRESS>
diset connection pg_port 5432
diset connection pg_sslmode prefer
diset tpch pg_scale_fact 10
diset tpch pg_num_tpch_threads 4
diset tpch pg_tpch_superuser postgres
diset tpch pg_tpch_superuserpass <PASSWORD>
diset tpch pg_tpch_defaultdbase postgres
diset tpch pg_tpch_user postgres
diset tpch pg_tpch_pass <PASSWORD>
diset tpch pg_tpch_dbase tpch
diset tpch pg_tpch_tspace pg_default
buildschema
```

pg_tproch_run.tcl

```
#!/bin/tclsh
dbset db pg
dbset bm TPC-H
diset connection pg_host <IP_ADDRESS>
diset connection pg_port 5432
diset connection pg_sslmode prefer
diset tpch pg_scale_fact 10
diset tpch pg_tpch_user postgres
diset tpch pg_tpch_pass <PASSWORD>
diset tpch pg_tpch_dbase tpch
diset tpch pg_total_querysets 1
diset tpch pg_degree_of_parallel 8
loadscript
vuset vu 3
vucreate
vurun
```

Read the report at https://facts.pt/3qhZD07

This project was commissioned by Dell Technologies.

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