TEST REPORT

Tolly.

#226112

August 2026

Commissioned by
Anduril Industries

Voyager VM 4.0 Tactical Edge Compute Platform

Performance Stability Under Sustained High-Temperature Operation

EXECUTIVE SUMMARY

Modern military operations increasingly depend on compute resources deployed far beyond the protection of conventional data centers. Tactical-edge systems must deliver dependable processing, storage, and communications capabilities while operating under the elevated temperatures that can be encountered during transport, deployment, and field operations.

Anduril commissioned Tolly to evaluate the thermal performance consistency of the Voyager VM 4.0 Tactical Edge Compute system during a 24-hour exposure to elevated temperatures. Tolly monitored system temperatures and ran recurring processor, memory, and storage workloads to determine whether the platform maintained consistent operation and performance throughout the test period.

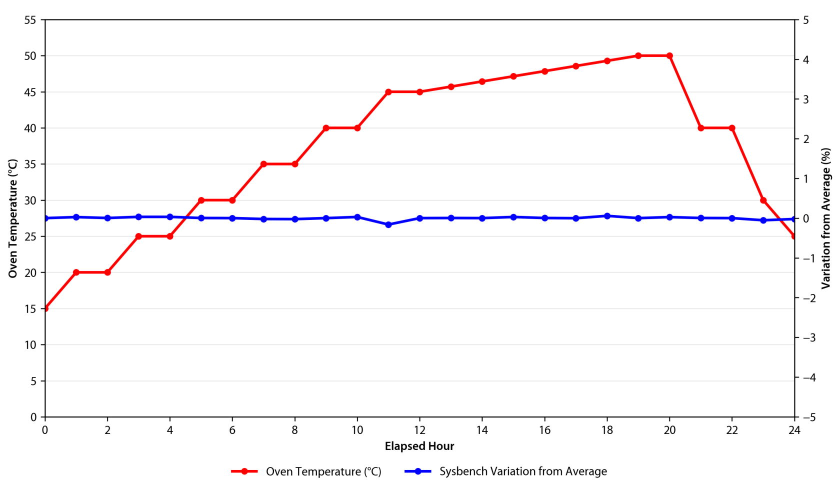
Testing showed that the Voyager VM 4.0 Tactical Edge Compute system maintained consistent CPU, memory, and file-operation performance throughout the 24-hour thermal test. Recurring benchmark measurements remained stable as chamber and processor temperatures changed, demonstrating predictable system operation under sustained elevated-temperature conditions. See The Bottom Line and Figure 1 for details.

THE BOTTOM LINE

Voyager VM 4.0 edge compute platform testing under sustained high temperature demonstrated:

1. Consistent compute, memory, and storage performance over 24 hours
2. Stable performance throughout sustained high-temperature operation
3. Sysbench CPU variation of just 0.22%
4. Combined CPU and memory variation of approximately 1%
5. Storage read/write variation of approximately 3%

Sysbench CPU Performance Variation During 24-Hour Thermal Test



Sysbench results showed only 0.22% variation despite sustained elevated temperatures.

Note: Tested running RHEL 9.8.

Source: Tolly, July 2026

Figure 1

Report link: https://www.tolly.com/publications/226112

Test Objectives

The objective of this test was to determine whether the Voyager VM 4.0 Tactical Edge Compute system could maintain consistent performance during prolonged exposure to elevated temperatures representative of harsh field operating conditions. Tolly evaluated the system over a 24-hour period while the chamber temperature was increased, sustained at high levels, and subsequently reduced.

Tolly ran recurring CPU, memory, and storage workloads throughout the test and monitored chamber and processor temperatures. The analysis focused on performance consistency across the full thermal cycle rather than peak benchmark results, with particular attention to identifying any degradation, instability, or interruption associated with increasing chamber and processor temperatures.

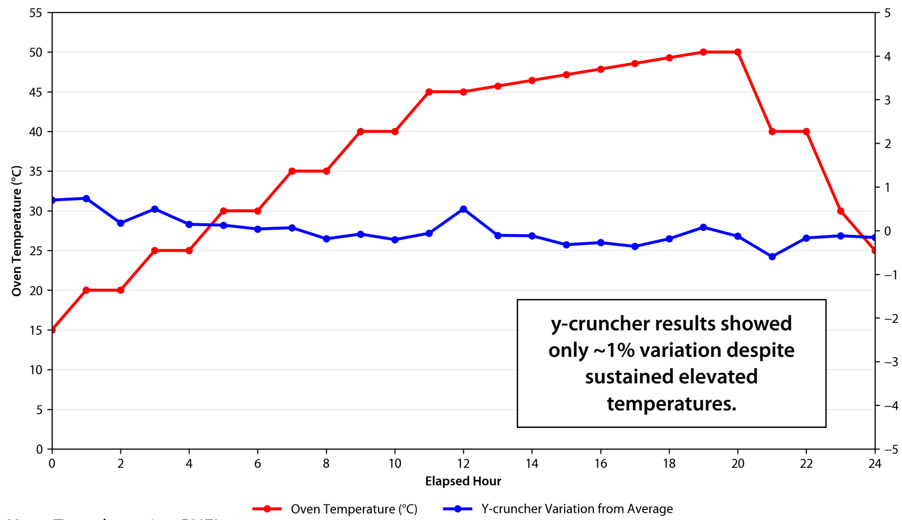
Test Results

Sysbench CPU Results

Sysbench CPU performance remained highly consistent throughout the 24-hour thermal test. Across the repeated measurements, results varied by only 0.22%, indicating that increasing chamber and processor temperatures had no meaningful effect on measured CPU performance. See Figure 1 on the previous page.

The results showed no sustained decline or instability during the high-temperature portion of the test. Performance remained essentially flat across the thermal cycle, demonstrating predictable processor operation under prolonged elevated-temperature conditions.

y-cruncher CPU and Memory Performance Variation During 24-Hour Thermal Test



Note: Tested running RHEL 9.8.

Source: Tolly, July 2026

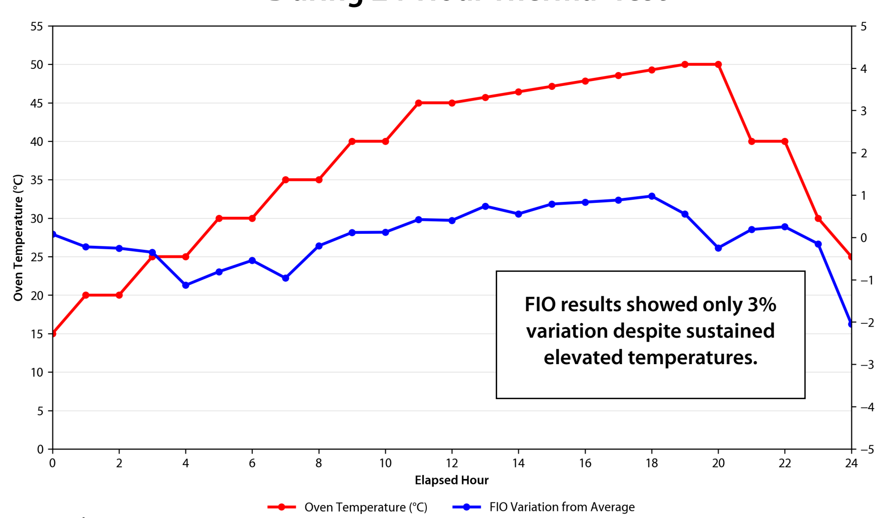
Figure 2

y-cruncher Results

y-cruncher performance remained consistent throughout the 24-hour thermal test. Completion times for the recurring 250-million-digit Pi calculations varied by only approximately 1%, showing that sustained elevated temperatures had little effect on combined CPU and memory performance.

The results showed no progressive slowdown or instability as chamber and processor temperatures increased. y-cruncher performance remained essentially steady across the thermal cycle,

FIO File System Input/Output Performance Variation During 24-Hour Thermal Test



Note: Tested running RHEL 9.8.

Source: Tolly, July 2026

Figure 3

demonstrating predictable compute and memory operation during prolonged high-temperature exposure. See Figure 2.

File I/O (FIO) Results

FIO storage performance remained stable throughout the 24-hour thermal test. Repeated random read/write measurements varied by approximately 3%, indicating that sustained elevated temperatures had no meaningful effect on file-operation performance.

The results showed no progressive decline, interruption, or instability during the high-temperature portion of the test. Storage performance remained consistent across the thermal cycle, demonstrating predictable read/write operation during prolonged exposure to elevated temperatures.

Test Setup & Methodology

Test Bed

Tolly installed the Voyager VM 4.0 Tactical Edge Compute system, running Red Hat Enterprise Linux 9.8, in a BINDER environmental test chamber and operated it continuously for approximately 24 hours.

The tested Voyager VM 4.0 system was equipped with a single Intel Xeon D-1746TER processor providing 10 physical cores and 20 logical processors, together with 128GB of system memory and NVMe storage. Storage workloads were directed to the primary RHEL filesystem.

The chamber temperature was increased in stages, maintained at elevated levels, and then reduced near the conclusion of the test. This profile enabled Tolly to evaluate system behavior throughout the heating, sustained-temperature, and cooling portions of the test cycle.

The system remained powered and enclosed in the chamber throughout testing. Power and network connections were routed outside the chamber so that the test team could operate and monitor the system without opening the chamber door or disturbing the controlled thermal environment. The system was not physically accessed during the active test period.

Tolly remotely accessed the system through its integrated OpenBMC-based management interface from a workstation located outside the chamber. Remote console access was used to confirm system operation, monitor status, initiate and review test activity, and inspect the timestamped result files generated throughout the test.

The chamber's programmed and actual temperatures were recorded during the test. Tolly also collected Linux sensor readings for the processor package and individual CPU cores. These measurements provided visibility into both the external chamber temperature and the internal thermal conditions experienced by the system.

CPU, memory, and storage workloads were run repeatedly at approximately hourly intervals. The workloads were executed sequentially rather than concurrently, helping prevent one workload from influencing the results of another. Each run generated a separate timestamped output file, allowing Tolly to verify test completion and compare performance consistency across the full thermal cycle.

Test Methodology

Sysbench

Tolly used Sysbench 1.0.20 to evaluate CPU processing consistency throughout the thermal test. Sysbench was configured to use all 20 logical processors and calculate prime numbers up to 200,000. Each run lasted approximately 10 seconds and reported processor throughput in events per second.

The test was run once per hour at approximately 15 minutes past the hour. Sysbench ran separately from the other workloads so that its results were not affected by concurrent y-cruncher or FIO activity. Each run was written to a uniquely timestamped result file for subsequent validation and analysis. Tolly compared the conforming hourly results to determine whether CPU performance changed as chamber and processor temperatures increased and decreased. Command lines for each test are shown in Figure 4.

y-cruncher

Tolly used y-cruncher v0.8.7, Build 9547-icx to evaluate combined CPU and memory performance consistency throughout the thermal test.

For each run, y-cruncher calculated Pi to 250 million decimal digits using the Chudnovsky algorithm in RAM-only mode. The workload used all 20 logical processors in the system. Tolly selected the 250-million-digit workload to provide a repeatable, computationally intensive test while ensuring that each run completed comfortably within the hourly test cycle.

The test ran once per hour, separately from Sysbench and FIO. Each run generated a timestamped validation file containing the computation time, processor utilization, multicore efficiency, configuration, and verification information. Tolly used total computation time as the principal measurement for comparing performance consistency across the 24-hour thermal cycle.

FIO

Tolly used FIO 3.35 to evaluate storage read/write consistency throughout the 24-hour thermal test. Each run created a 4GB test file on the RHEL filesystem and generated a random mixed read/write workload consisting of 70% reads and 30% writes using 4KB blocks.

FIO used the Linux asynchronous I/O engine with a queue depth of 32 and four concurrent jobs. Direct I/O was enabled to bypass the operating-system page cache and more directly exercise the underlying storage. Each run included a 30-second ramp period followed by a five-minute timed workload.

The test ran approximately once per hour, separately from Sysbench and y-cruncher. FIO recorded each run in a uniquely timestamped JSON file. Tolly used combined read and write IOPS as the principal measurement for evaluating storage-performance consistency across the thermal cycle. After each run, the script deleted the temporary test file.

Anduril Ind.

Voyager VM 4.0

Performance under Sustained High Temperatures

Tolly. Certified

Tested July 2026

Test Command Line Details

Sysbench

```
sysbench cpu --threads=$(nproc)
--cpu-max-prime=200000 run > $OUTFILE
```

y-cruncher

```
../../y-cruncher\ v0.8.7.9547-static/
y-cruncher bench 250m
```

FIO

```
fio --filename="./tmp/fio/fio.data" \
      --size="4G" \
      --direct=1 \
      --rw="randrw" \
      --rwmixread=70 \
      --bs="4k" \
      --ioengine=libaio \
      --iodepth=32 \
      --numjobs=4 \
      --time_based \
      --runtime=300 \
      --ramp_time=30 \
      --eta=never \
      --group_reporting \
      --name="rhel_9_randrw_5min" \
      --output-format=json \
      --output="${OUTFILE}"
```

Source: Tolly, July 2026

Figure 4

About Tolly

The Tolly Group companies have been delivering world-class IT services for more than 35 years. Tolly is a leading global provider of third-party validation services for vendors of IT products, components and services.

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