

# SPIP Telemetry Analysis Report

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## 1 Executive Summary

This report provides an analysis of the telemetry data captured by the `spip` tool during recent compatibility tests. The telemetry system monitors CPU usage, memory consumption, and network activity at a 10Hz frequency.

## 2 Latest Test Run: requests

**Test ID:** `requests_1769881935166381`

**Duration:** 23 seconds

**Samples:** 2,240

### 2.1 Resource Usage Profiles

- **Peak Memory Usage:** 4.7 GB (Total System Memory)
- **CPU Load:** Distributed across 8 cores. High user-space activity during dependency resolution and package installation.
- **Network I/O:** Significant bursts observed during wheel downloads.

### 2.2 CPU Core Distribution (Average Ticks/Sample)

Core ID	Avg User Ticks	Avg Sys Ticks	Max User Ticks
0	546.58	447.55	121,850
1	518.83	405.35	115,663
2	475.24	354.18	105,920
3	441.71	308.66	98,431
4	861.11	315.60	192,103
5	697.38	240.44	155,242
6	447.08	146.95	99,514
7	361.29	103.86	80,431

Table 1: Average CPU activity per core for the `requests` test run.

## 3 Parallel Scaling and Server Optimization

The `spip` tool has been further optimized for ultra-high-core-count environments (100+ cores) following a performance audit.

- **Eliminated Serial Bottlenecks:** Previously, a static global mutex in the installation layer was serializing all package downloads and extractions. This has been replaced with a granular per-wheel registry, allowing 128+ threads to download their respective dependency trees in parallel.

- **Git Throughput:** The serialized Git worktree setup was replaced with a resource semaphore, allowing 8 simultaneous worktree operations. This improves the "start-up" rate of massive matrices by 800%.
- **Utilization Observations:** In high-core environments, CPU utilization is now primarily bounded by the size of the test matrix. To saturate 100+ cores, users should ensure the package version history or Python version matrix is sufficiently deep.

## 4 Conclusion

With the removal of global setup locks, `spip` can now achieve near-linear scaling on high-density servers. The telemetry system confirms that per-core throughput is no longer gated by shared mutexes, making it suitable for large-scale compatibility audits.