Physical Host Telegraf Metrics - Units of Measurement Analysis

Based on your Telegraf configuration using **inputs.cpu**, **inputs.mem**, inputs.net, **inputs.processes**, **inputs.disk**, and **inputs.diskio** plugins, I've analyzed each metric from your physical host Prometheus data sample. Here's the comprehensive breakdown:

CPU Statistics (cpu plugin)

All CPU metrics use **percentage (%)** as their unit of measurement and represent **instantaneous** values:[1] [2]

- `physical_cpu_usage_idle`: 93.51% - percentage of time CPU spent idle (not doing work)
- `physical_cpu_usage_iowait`: 0.15% - percentage of time CPU spent waiting for I/O operations to complete
- `physical_cpu_usage_system`: 1.26% - percentage of time CPU spent in kernel/system mode
- `physical_cpu_usage_user`: 5.03% - percentage of time CPU spent in user mode

These values represent the current CPU utilization breakdown and should sum close to 100% when all CPU states are included.[3] [1]

Disk Space Statistics (disk plugin)

Disk space metrics are measured in **bytes** and represent **instantaneous** values:[4] [5] [1]

Space Metrics:

- `physical_disk_free`: Available free space on each partition (e.g., 159,992,803,328 bytes for root)
- `physical_disk_total`: Total capacity of each partition (e.g., 247,660,507,136 bytes for root)
- `physical_disk_used`: Used space on each partition (e.g., 75,012,653,056 bytes for root)

Inode Metrics:

- `physical_disk_inodes_free`: Number of free inodes available (e.g., 13,950,599 for root partition)

Inodes are measured as **count** - they represent file system metadata entries, not storage space.[6] [7] [8]

Disk I/O Statistics (diskio plugin)

Disk I/O metrics include both instantaneous and cumulative measurements:[9] [10] [11]

Utilization (instantaneous):

- `physical_diskio_io_util`: 0.14% - **percentage** representing disk I/O utilization[12]

Traffic (cumulative counters):

- `physical_diskio_read_bytes`: 18,431,785,472 bytes - total bytes read from disk since boot
- `physical_diskio_write_bytes`: 392,556,835,840 bytes - total bytes written to disk since boot

These byte counters are cumulative since system boot and require rate functions for bandwidth calculations.[10] [9]

Memory Statistics (mem plugin)

All memory metrics are measured in **bytes** and represent **instantaneous** values:[13] [14] [15]

Physical Memory:

- `physical_mem_total`: 33,525,415,936 bytes (~31.2 GB) - total physical RAM
- `physical_mem_used`: 9,293,602,816 bytes (~8.7 GB) - currently used physical memory

Swap Memory:

- `physical_mem_swap_total`: 8,589,930,496 bytes (~8 GB) - total swap space
- `physical_mem_swap_free`: 8,499,228,672 bytes (~7.9 GB) - available swap space

Network Statistics (net plugin)

Network metrics use **bytes** for data transfer and **count** for packets/errors, all as **cumulative counters** since boot:[1]

Data Transfer (cumulative bytes):

- `physical_net_bytes_recv`: 1,355,640,446 bytes received
- `physical_net_bytes_sent`: 151,079,147 bytes sent

Packet Counts (cumulative counts):

- `physical_net_packets_recv`: 1,150,737 packets received
- `physical_net_packets_sent`: 466,853 packets sent
- `physical_net_drop_in/out`: Dropped packet counts (0 in your sample)
- `physical_net_err_in/out`: Error packet counts (0 in your sample)

Process Statistics (processes plugin)

Process metrics are measured as **instantaneous counts**:[16]

- `physical_processes_running`: 0 - currently running processes
- `physical_processes_sleeping`: 312 - sleeping processes
- `physical_processes_total`: 404 - total processes
- `physical_processes_zombies`: 1 - zombie processes

Key Monitoring Insights

Data Types:

- **Instantaneous**: CPU percentages, memory usage, disk space, process counts, disk I/O utilization
- **Cumulative Counters**: Network traffic, disk I/O bytes (reset only on reboot)

Rate Calculations:
For monitoring dashboards, use Prometheus `rate()` or `irate()` functions with cumulative metrics (network bytes, disk I/O bytes) to calculate:

- Network bandwidth (bytes/second)
- Disk throughput (bytes/second)
- Packet rates (packets/second)

Unit Conversions:

- **Memory/Disk**: Values are in bytes - divide by 1024^3 for GB, 1024^2 for MB
- **CPU**: Already in percentages (0-100%)
- **Network**: Bytes - common to convert to Mbps for bandwidth monitoring

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1. https://cloud.megaease.cn/docs/manual/90.metrics-collection/01.host
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4. https://www.influxdata.com/integration/cpu/
5. https://docs.teskalabs.com/logman.io/system-monitoring/metrics/disk-metrics/
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7. https://stackoverflow.com/questions/37634358/graphing-cpu-usage-on-grafana-using-influxdb-data-from-telegraf
8. https://www.influxdata.com/integration/disk/
9. https://community.influxdata.com/t/strange-behaviour-of-telegraf-and-or-diskio-plugin/4164
10. https://docs.influxdata.com/telegraf/v1/plugins/
11. https://community.influxdata.com/t/telegraf-inputs-vsphere-host-memory-total-and-usage-available/33337

12. https://community.influxdata.com/t/telegraf-diskio-plugin-timing-issue-on-linux/1366
13. https://pkg.go.dev/github.com/shanas-swi/telegraf-v1.16.3/plugins/inputs/diskio
14. https://github.com/influxdata/telegraf/blob/master/plugins/inputs/swap/README.md?plain=1
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16. https://www.baeldung.com/linux/free-inode-usage
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24. https://checkmk.com/integrations/disk_io_utilization
25. https://stackoverflow.com/questions/653096/how-to-free-inode-usage
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