Analyzing System Metrics with Performance Co-Pilot

The Performance Co-Pilot (PCP) analysis toolkit collects, processes and analyzes system performance metrics, either in real time or from archived logs. SUSE Linux Enterprise Server for NVIDIA provides PCP as regular packages, so you install and configure it like any other system service, without needing a container runtime. Use PCP to monitor a single system locally or to centralize monitoring of several remote systems on one host.

Prerequisites

- A running, registered instance of SUSE Linux Enterprise Server for NVIDIA

Publication Date: 12 Nov 2026

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1 What is Performance Co-Pilot analysis toolkit?

Performance data is collected by *performance metrics domain agents* (PMDAs), one per subsystem such as the kernel, disks or a database. Each PMDA passes its metrics to the `pmcd` daemon, which is the single point of contact for all other PCP tools. **`pmlogger`** is the tool that turns those live metrics into an archive you can query later, and **`pminfo`** queries them directly, without logging anything.

2 Installing PCP

This chapter covers installing `pcp` via Zypper in standard mode or via **`transactional-update`** in immutable mode.

2.1 Installing PCP in standard mode

Install the `pcp` package with Zypper:

```
> sudo zypper install pcp
```

Alternatively, install the `pcp-zeroconf` package instead. It installs `pcp` as a dependency and additionally enables and starts **`pmcd`**, **`pmlogger`** and **`pmproxy`** automatically, with a shorter, 10-second sampling interval. Use it if you want local monitoring running immediately without configuring the services yourself, as described in *Section 3, "Enabling PCP services"*:

```
> sudo zypper install pcp-zeroconf
```

2.2 Installing PCP in immutable mode

On the immutable mode of SLE for NVIDIA, install either package through **`transactional-update`** instead:

```
> sudo transactional-update pkg install pcp
```

Or, for the zero-configuration variant:

```
> sudo transactional-update pkg install pcp-zeroconf
```

Changes take effect only after a reboot:

```
> sudo reboot
```

3 Enabling PCP services

Installing the `pcp` package installs several `systemd` services, all disabled by default. PCP provides the following services:

`pmcd`
: The Performance Metrics Collector Daemon. It coordinates the gathering and exporting of performance statistics in response to requests from PCP tools, and is required by every other PCP service. By default, it listens only on the local host, on port *44321*.

`pmlogger`
: Records the metrics exported by **`pmcd`** to archive logs, by default under `/var/log/pcp/pmlogger/HOSTNAME/`.

`pmproxy`
: Exposes a REST API (PMWEBAPI) to access metrics remotely, on port *44322* by default. Unlike **`pmcd`**, it listens on all interfaces by default.

`pmie`
: The inference engine. It evaluates the exported metrics against a set of rules and can trigger an action, for example, an alert, when a rule matches.

Enable and start the services you need with **`systemctl`**. For example, to enable local metric collection and logging:

```
> sudo systemctl enable --now pmcd pmlogger
```

Add `pmproxy` or `pmie` to the same command if you need the REST API or the inference engine.

By default, **`pmcd`** only accepts connections from the local host, and `firewalld` does not open a port for either **`pmcd`** or **`pmproxy`**. If you need to reach either service from another system, open the corresponding port:

```
> sudo firewall-cmd --add-port=PORT/tcp --permanent
> sudo firewall-cmd --reload
```

Use port *44321* for **pmcd** and *44322* for **pmproxy**. Allowing remote connections to **pmcd** also requires changing PMCD_LOCAL, as described in *Section 4, "Configuring **pmcd** and **pmlogger**"*.

4 Configuring **pmcd** and **pmlogger**

Every PCP service has a default configuration that might not suit your needs. To customize a service, edit its configuration file directly and restart the service. For example, to customize **pmcd**, run:

```
> sudo vi /etc/sysconfig/pmcd
> sudo systemctl restart pmcd
```

4.1 Configuring the **pmcd** daemon

The **pmcd** daemon configuration is stored in the /etc/sysconfig/pmcd file. The file stores environment variables that modify the behavior of the **pmcd** daemon.

You can add the following variables to the /etc/sysconfig/pmcd file to configure the **pmcd** daemon:

PMCD_LOCAL
: Defines whether a remote host can connect to the **pmcd** daemon. If set to *0*, remote connections to the daemon are allowed. If set to *1*, the daemon listens only on the local host. The default value is *1*.

PMCD_MAXPENDING
: Defines the maximum count of pending connections to the agent. The default value is *5*.

PMCD_ROOT_AGENT
: If the pmdaroot is enabled (the value is set to *1*), adding a new PDMA does not trigger restarting of other PMDAs. If pmdaroot is not enabled, **pmcd** will require restarting all PMDAs when a new PMDA is added. The default value is *1*.

PMCD_RESTART_AGENTS
: If set to *1*, the **pmcd** daemon tries to restart any exited PMDA. Enable this option only if you have enabled pmdaroot, as **pmcd** itself does not have privileges to restart PMDA. The default value is *1*.

PMCD_WAIT_TIMEOUT
: Defines the maximum time in seconds **pmcd** can wait to accept a connection. After this time, the connection is reported as failed. The default value is *60*.

PCP_NSS_INIT_MODE

Defines the mode in which **pmcd** initializes the NSS certificate database when secured connections are used. The default value is `readonly`. You can set the mode to `readwrite`, but if the initialization fails, the default value is used as a fallback.

For example, to allow remote connections and increase the connection timeout, change only these two lines and leave the rest at their default:

```
PMCD_LOCAL=0
PMCD_WAIT_TIMEOUT=70
```

4.2 Setting **pmlogger** variables

The custom configuration for the **pmlogger** is stored in the following configuration files:

- `/etc/sysconfig/pmlogger`
- `/etc/pcp/pmlogger/control.d/local`

4.2.1 The `/etc/sysconfig/pmlogger` file

You can use the following attributes to configure the **pmlogger**:

PMLOGGER_LOCAL

Defines whether **pmlogger** allows connections from remote hosts. If set to *1*, **pmlogger** allows connections from a local host only. The default value is *1*.

PMLOGGER_MAXPENDING

Defines the maximum count of pending connections. The default value is 5.

PMLOGGER_INTERVAL

Defines the default sampling interval **pmlogger** uses. The default value is *60 s*, unless `pcp-zeroconf` is installed, in which case the default is *10 s*. The **pmlogger** command line overrides this value.

PMLOGGER_CHECK_SKIP_LOGCONF

Setting this option to *yes* disables the regeneration and checking of the **pmlogger** configuration if the configuration **pmlogger** comes from **pmlogconf**. The default behavior is to regenerate configuration files and check for changes every time **pmlogger** is started.

PMLOGGER_CHECK_SKIP_JANITOR

By default, **pmlogger_check** also runs **pmlogger_janitor** to detect **pmlogger** processes or files that became detached from the control files that used to manage them. Setting this option to *yes* disables **pmlogger_janitor**, which can be useful for QA or other special testing.

An example follows:

```
PMLOGGER_LOCAL=1
PMLOGGER_MAXPENDING=5
PMLOGGER_INTERVAL=10
PMLOGGER_CHECK_SKIP_LOGCONF=yes
```

4.2.2 The /etc/pcp/pmlogger/control.d/local file

The file `/etc/pcp/pmlogger/control.d/local` stores specifications of the host, which metrics should be logged, the logging frequency (default is 24 hours), and **pmlogger** options. For example:

```
# === VARIABLE ASSIGNMENTS ===
#
# DO NOT REMOVE OR EDIT THE FOLLOWING LINE
$version=1.1

# Uncomment one of the lines below to enable/disable compression behaviour
# that is different to the pmlogger_daily default.
# Value is days before compressing archives, 0 is immediate compression,
# "never" or "forever" suppresses compression.
#
#$PCP_COMPRESSAFTER=0
#$PCP_COMPRESSAFTER=3
#$PCP_COMPRESSAFTER=never

# === LOGGER CONTROL SPECIFICATIONS ===
#
#Host           P?  S?  directory                       args

# local primary logger
LOCALHOSTNAME   y   n   PCP_ARCHIVE_DIR/LOCALHOSTNAME   -r -T24h10m -c config.default -v
 100Mb
```



Note: Local host by default

The `LOCALHOSTNAME` entry shown above logs metrics from the local host only. To collect metrics from a remote client instead, see *Section 5.3, "Recording metrics from remote systems"*.

5 Managing PCP metrics

To check the local setup, use **pminfo** to list metrics and the **pcp** command. You can also collect metrics from remote systems on one central host.

5.1 Listing PCP metrics

When **pmcd** is running, use the command **pminfo** to list metrics. It requires no special privileges. For example, to list all available performance metrics, run:

```
> pminfo
```

You can list a group of related metrics by specifying the metrics prefix:

```
> pminfo METRIC_PREFIX
```

For example, to list all metrics related to disks, use:

```
> pminfo disk

disk.dev.r_await
disk.dm.await
disk.dm.r_await
disk.md.await
disk.md.r_await
...
```

You can also specify additional strings to narrow down the list of metrics, for example:

```
> pminfo disk.dev

disk.dev.read
disk.dev.write
disk.dev.total
disk.dev.blkread
disk.dev.blkwrite
disk.dev.blktotal
...
```

To get online help text of a particular metric, use the `-t` option followed by the metric, for example:

```
> pminfo -t kernel.cpu.util.user
```

```
kernel.cpu.util.user [percentage of user time across all CPUs, including guest CPU time]
```

To display a description text of a particular metric, use the `-T` option followed by the metric, for example:

```
> pminfo -T kernel.cpu.util.user

Help:
percentage of user time across all CPUs, including guest CPU time
```

5.2 Checking local metrics

After you enable the PCP services, you can verify that metrics are being recorded properly by running the following command:

```
> sudo pcp

Performance Co-Pilot configuration on node1:

 platform: Linux node1 6.12.0-160099.49-default #1 SMP PREEMPT_DYNAMIC Thu Aug 6 09:32:38
 UTC 2026 (e38429b) x86_64
 hardware: 2 cpus, 1 disk, 1 node, 3917MB RAM
 timezone: UTC
 services: pmcd pmproxy
     pmcd: Version 6.3.8-1, 9 agents, 1 client
     pmda: root pmcd proc pmproxy xfs linux mmv kvm jbd2
 pmlogger: primary logger: /var/log/pcp/pmlogger/node1/20260607.09.24
```

Now check if the logs are written to a proper destination:

```
> ls PATH_TO_PMLOGGER_LOGS
```

where *`PATH_TO_PMLOGGER_LOGS`* should be `/var/log/pcp/pmlogger/`*`HOSTNAME`*`/`, with *`HOSTNAME`* being the machine's own host name, the output of the **`hostname`** command—for example, `/var/log/pcp/pmlogger/node1/`.

5.3 Recording metrics from remote systems

You can collect metrics from several remote systems (clients) on a central monitoring system. Each client needs only **`pmcd`** running and reachable. **`pmlogger`** on the monitoring system then pulls the metrics from every client and logs them locally.

PROCEDURE 1: RECORDING METRICS FROM A REMOTE CLIENT

1. On each client, install PCP as described in *Section 2, "Installing PCP"*, then allow remote connections and enable **`pmcd`**:

```
> sudo sed -i 's/^PMCD_LOCAL=1/PMCD_LOCAL=0/' /etc/sysconfig/pmcd
> sudo systemctl enable --now pmcd
```

2. On each client, open the **`pmcd`** port in `firewalld`:

```
> sudo firewall-cmd --add-port=44321/tcp --permanent
> sudo firewall-cmd --reload
```

3. On the monitoring system, create a **`pmlogger`** control file for each client under `/etc/pcp/pmlogger/control.d/`, for example `/etc/pcp/pmlogger/control.d/`*`CLIENT`*, with the following content:

```
$version=1.1

CLIENT_HOSTNAME n n PCP_ARCHIVE_DIR/CLIENT -N -r -T24h10m -c config.default -v 100Mb
```

   `CLIENT_HOSTNAME` must be resolvable in DNS; you can use an IP address or a fully qualified domain name (FQDN) instead. For details about the control file format, see *Section 4.2.2, "The `/etc/pcp/pmlogger/control.d/local` file"*.



Warning: Silent logging failure from a pre-created archive directory

Leave `PCP_ARCHIVE_DIR/`*`CLIENT`* (by default, `/var/log/pcp/pmlogger/`*`CLIENT`*) for **`pmlogger`** to create itself, with the correct ownership. If it already exists and is owned by `root`, **`pmlogger`**—which runs as the `pcp` user—cannot write its lock file there, and logging fails without an obvious error.

4. Trigger a check so **`pmlogger`** applies the new control file immediately, instead of waiting for the next scheduled run of `pmlogger_check.timer`:

```
> sudo systemctl start pmlogger_check.service
```

5. Confirm that metrics are being collected from the client:

```
> ls -l /var/log/pcp/pmlogger/CLIENT/
```

```
total 288
-rw-r--r--. 1 pcp pcp  35032 Sep  3 16:07 20260903.16.07.0
-rw-r--r--. 1 pcp pcp    904 Sep  3 16:07 20260903.16.07.index
-rw-r--r--. 1 pcp pcp 219161 Sep  3 16:07 20260903.16.07.meta
-rw-r--r--. 1 pcp pcp    276 Sep  3 16:07 Latest
-rw-r--r--. 1 pcp pcp  27174 Sep  3 16:07 pmlogger.log
```

6 For more information

- For more information about PCP, see the upstream documentation at https://pcp.readthedocs.io/en/latest/UAG/IntroductionToPcp.html.
- To learn more about individual tools, see the man pages of **pmcd**, **pmlogger** and **pminfo**.

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