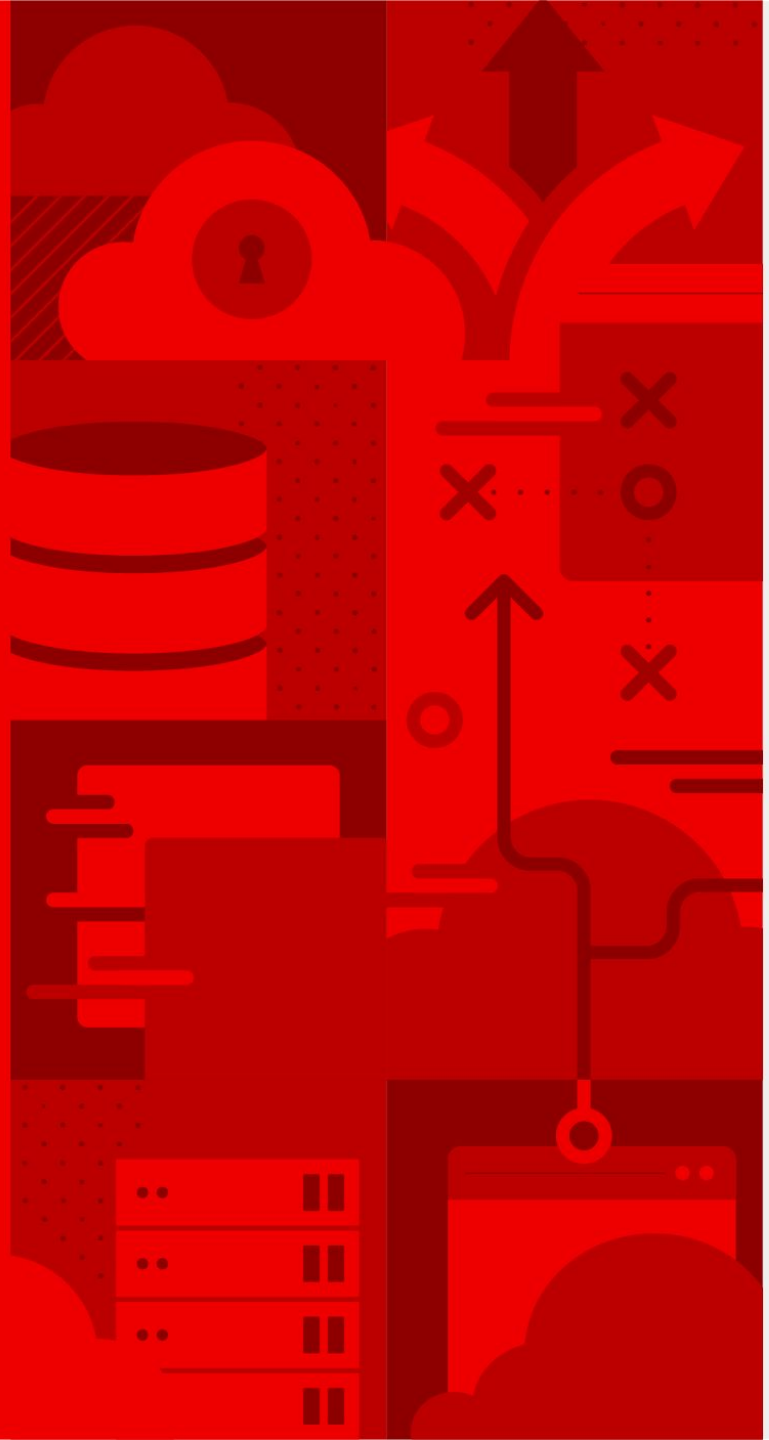


Performance Co-Pilot for SBR-Kernel Support

Introduction into Performance Co-Pilot (PCP) and its use for SBR-Kernel Support

Charles Haithcock
Software Maintenance Engineer
SBR-Kernel, Support Delivery

Red Hat

What we'll be discussing today

What is PCP?	Example Usage
Terms/Concepts	Common Use
Architecture	Common Issues

What is PCP?

Performance Co-Pilot (PCP)

Performance monitoring, metric collection, and metric presentation

Highly Capable

- Distributed and Scalable
- Backwards Compatibility
- OS-Agnostic
- Extensible and Customizable

Terminology and Concepts

Metrics are organized hierarchically into tree-like structures

Levels in the trees refine the relationships between metrics within those subtrees

Domain A logical grouping of metrics typically based on source

- NFS Client
- Linux (Kernel)
- Nginx
- Windows

Terminology and Concepts

Examples

`network.interface.in.bytes`

- Linux domain
- Network namespace
- Network-specific metrics
- Network interface metrics
- Ingress network traffic metrics
- Amount of ingress traffic in bytes

`mem.freemem`

- Linux domain
- Memory namespace
- Memory-specific metrics
- Free memory metrics

Terminology and Concepts

Instances are the existing sources of a metric, such as the amount of installed memory or the kernel version

Instance Domains is the set of sources associated with a metric

The set of PIDs and the await for each disk would be instance domains for example

```
r7 # pminfo -f network.interface.in.bytes

network.interface.in.bytes                    ← Metric
    inst [0 or "eth0"] value 15853434         ← Instance ←---- Instance Domain
    inst [1 or "lo"] value 18080              ← Instance ←/
```

Architecture (Internal)

PMID Performance Metrics IDentifier, unique number associated with each metric

PMNS Performance Metrics Namespace, hierarchical organization of metrics where leaf nodes map to PMIDs

PMDA Performance Metrics Domain Agent, retrieves metrics from resective domain

PMCD Performance Metrics Collector Daemon, controls PMDAs, middle man between clients and PMDAs

Architecture (External)

`pminfo` Displays metadata about metrics in PMDAs

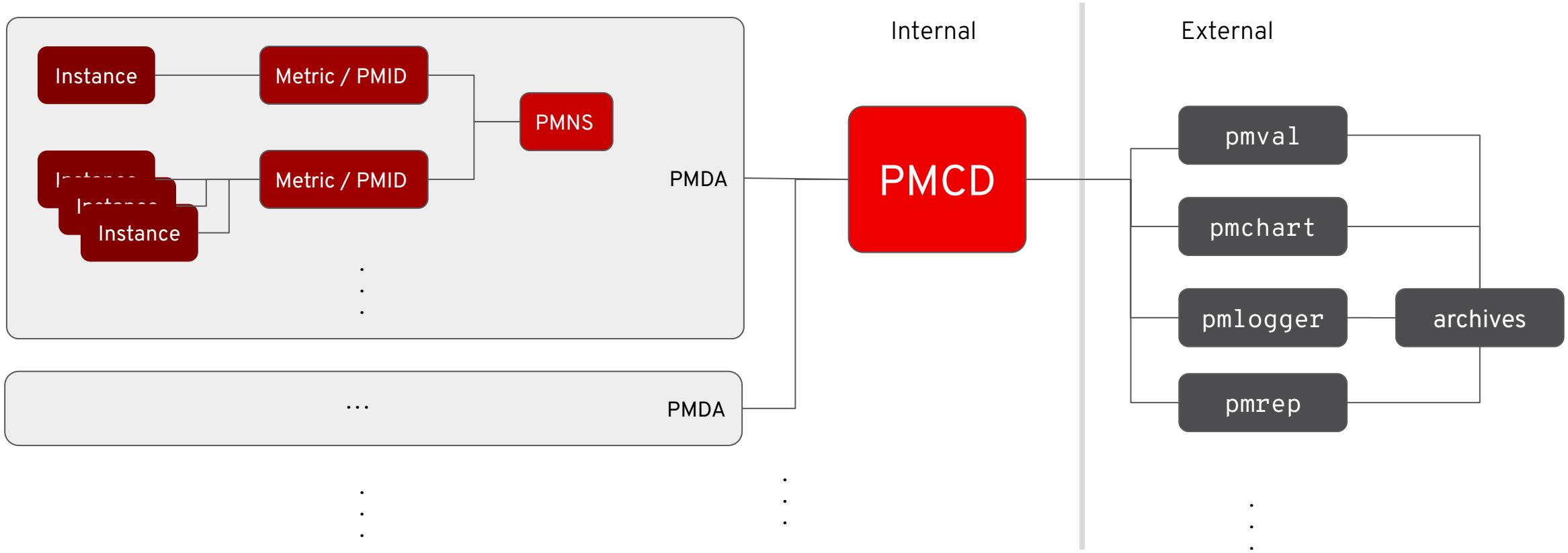
`pmval` Displays info about a metric and its raw values

`pmrep` Highly customizable metric reporting tool

Can either use command line args to report or use a prebuilt view in `/etc/pcp/pmrep/pmrep.conf`

`pmlogger` Logs metrics into archives

Architecture Representation



Red Hat

Example Usage

```
pcp collectl -s c --verbose
pmrep :sar-B-old-kernel
pmrep :sar-r
pcp mpstat -P ALL
pmrep :sar-u-ALL-P-ALL
```

Configurations

PMDAs are enabled/disabled by “installing” or “removing” them

```
# /var/lib/pcp/pmdas/prometheus/{Install,Remove}
```

“Installing/Removing” does not mean pmlogger will begin collection from that PMDA.

pmlogger must be configured to pull metrics from that PMDA.

Relevant configs should be put into `/var/lib/pcp/config/pmlogconf/<your tool>/<conf file>`

Common Use - Archives

Metrics can be logged with *pmlogger* into *archives*, similar to SAR's `sa` files and `*.raw.gz` collectl logs

Archives stored in `/var/log/pcp/pmlogger/<HOSTNAME>/` by default

Archives are named by the date the capture started and split into three files

- Data files, ending in `.#` (.0, .1, etc) and contain the raw metric data
- Index files, ending in `.index`, and is a temporal index for data files to allow rapid access of data points
- Metadata files, ending in `.meta`, which describe instance domains, metrics, etc for the archives

`pcp-zeroconf` One-shot package to install and start necessary components for support in general

Common Use - Options

`-a/--archive <ARCHIVE>` source data from the archive instead of the running system

`-z/--hostzone` report timestamps from the timezone the data was collected from rather than current one

`-t N<s,m,h,...>` change the time interval between samples to N seconds, minutes, or hours

`-S/-T <['@ DAY MON #] HH:MM[:SS YYYY']>` what time stamp to start/stop reporting metrics

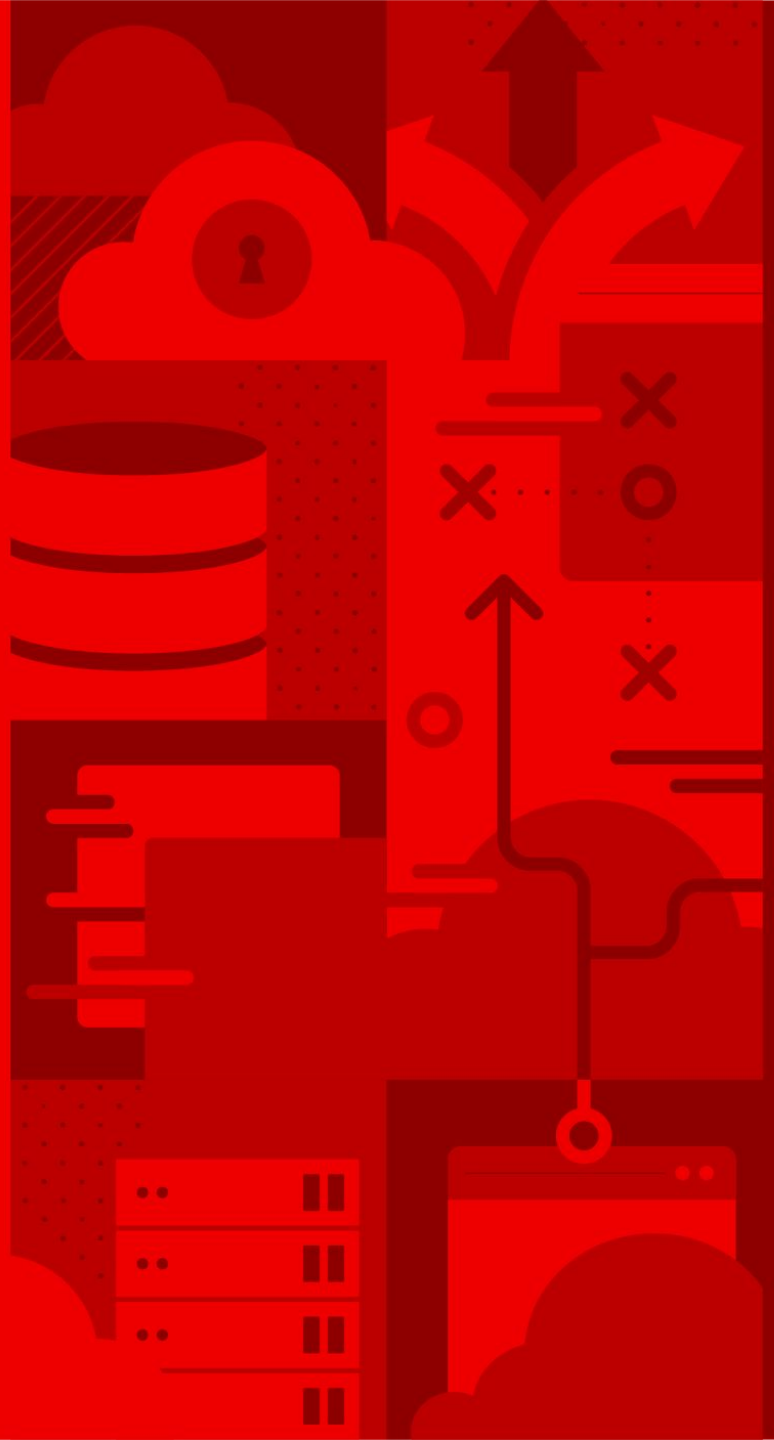
- `-S 10:05` start reporting metrics collected from after 10:05 AM
- `-T '@ Tue Nov 5 11:59:00 1990'` report metrics collected from before that date

By default, data is reported from the start of the data collection window

Common Use - Workflow

```
pmdumplog -z -L <ARCHIVE>   # What archive has the data you need?
pmrep :sar-u-ALL-P-ALL -z -t 1m -a <ARCHIVE> # CPU usage
pmrep :sar-w -z -t 1m -a <ARCHIVE>   # forking and context switches
pmrep :sar-W -z -t 1m -a <ARCHIVE>   # swapin/out activity
pmrep :sar-B-old-kernel -z -t 1m -a <ARCHIVE>   # paging activity
...
```

Check in `/etc/pcp/pmrep/pmrep.conf` for more predefined views



PCP Play time!

Common Issues

```
r7 # pcp -a /var/log/pcp/pmlogger/r7/20190208.09.30 dmcache
Error: not all required metrics are available
Missing: ['dmcache.cache.used', ... , 'dmcache.write_misses']
```

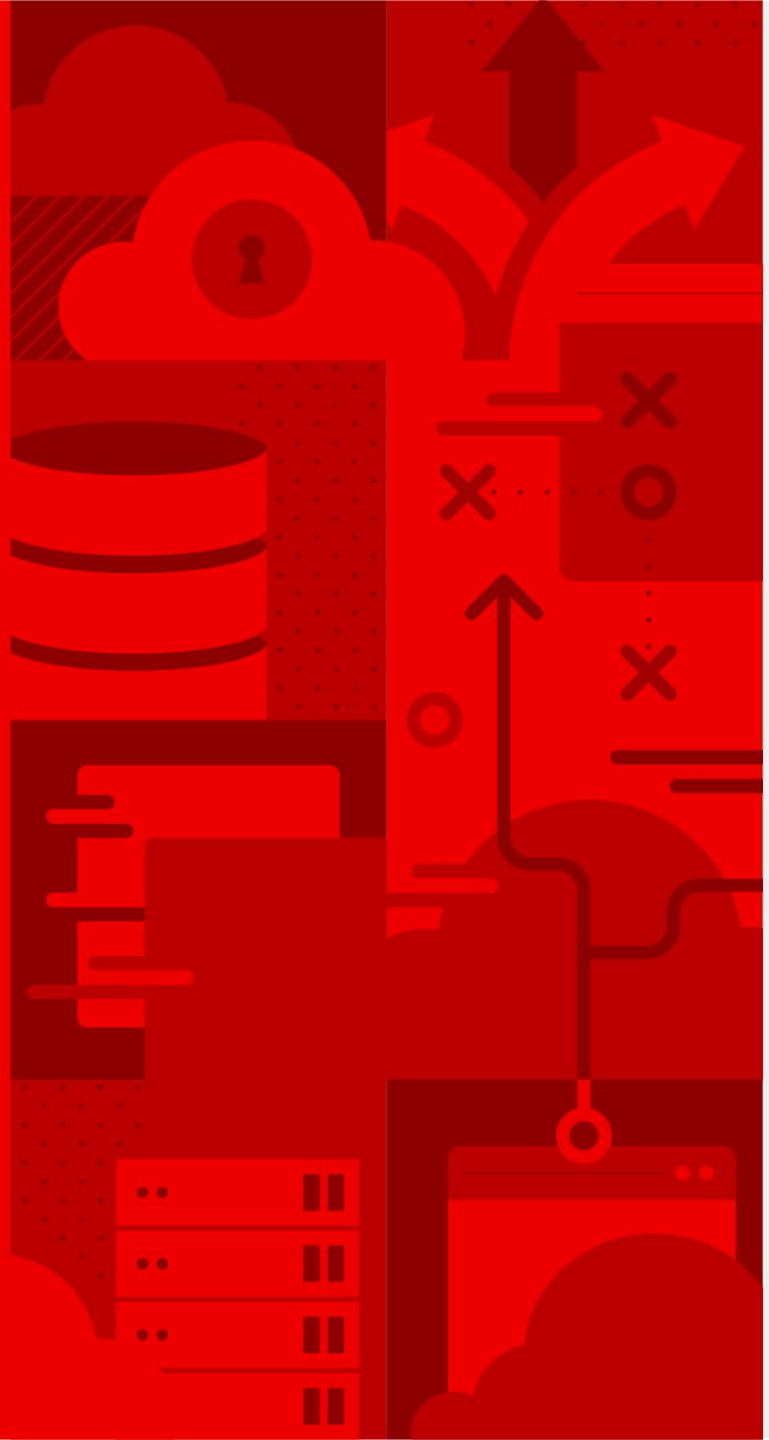
Typically happens when a view or tool requires a metric that was not captured. Use pminfo to check.

Common Issues

```
$ less var/log/pcp/pmlogger/HOSTNAME/pmlogger.log
Warning [/var/lib/pcp/config/pmlogger/config.default, line 96]
Description unavailable for metric "mem.util.swapFree" ... not logged
Reason: No PMCD agent for domain of request

$ less var/log/pcp/pmcd/pmcd.log
[Tue Oct  8 13:46:24] pmcd(34290) Warning: pduread: timeout (after 5.000
sec) while attempting to read 12 bytes out of 12 in HDR on fd=19
```

The above can happen when a PMDA dies/is not started. A PMDA can die due to performance issues



Thank you

Red Hat is the world's leading provider of enterprise open source software solutions. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500.

linkedin.com/company/red-hat

facebook.com/redhatinc

youtube.com/user/RedHatVideos

twitter.com/RedHat

Red Hat