Performance Co-Pilot (PCP)

PerfClub, Sept 21, 2020

Why Am I Looking At Performance?

- IRNC:PIREN (2020) will look anew at how host performance
- Very interested in finding out where host performance bottlenecks are
- Not like troubleshooting -- there is always a bottleneck…
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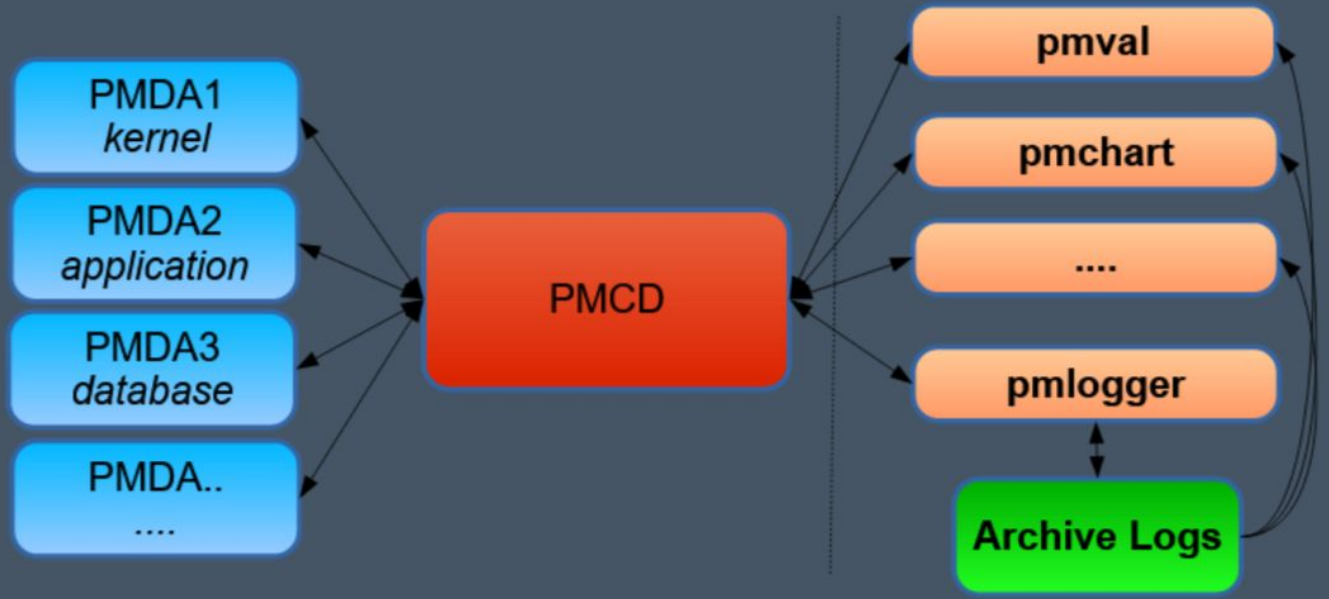
Performance Co-Pilot (http://pcp.io)

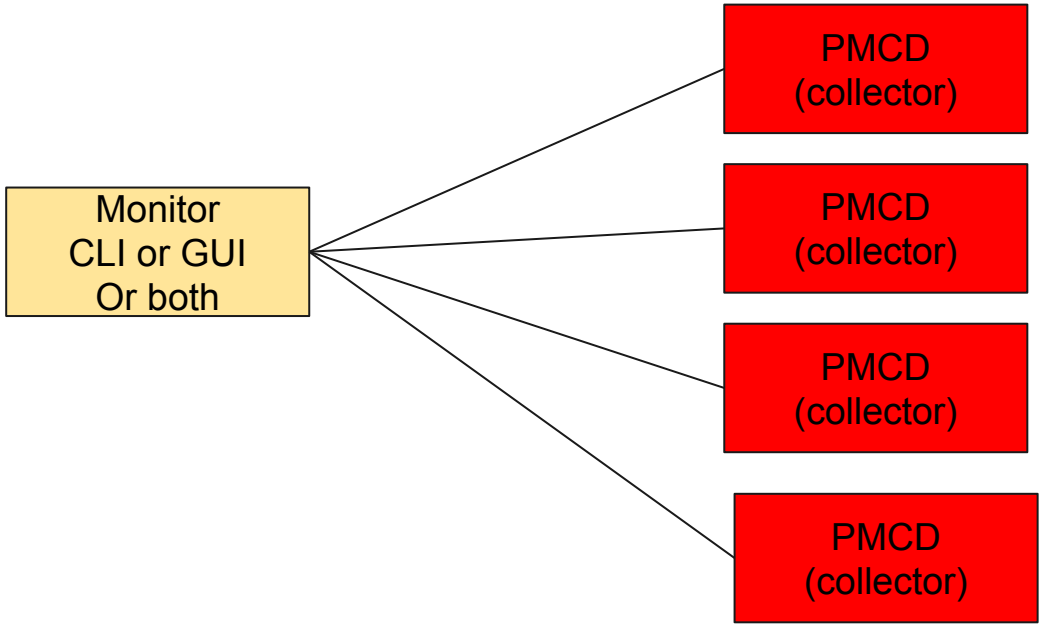
- A 20-year-old, well-thought-out performance analysis tool which is used by performance experts
- Allows highly-optimized collection and viewing, logging, combining, alerting, of system metrics
- Defines a modular, unified namespace (PMNS) for system metrics, with expansion and customization capabilities
- Defines a unified API for accessing metrics in real time or from archives, effectively making all metrics, same-access-method
- Comes with a toolset that reflects PCP's history as a framework that *gets used*.
    - (e.g. Cisco module includes separate diagnostic tools)
- Container and cgroup aware; can show Docker (et al) host and container metrics side-by-side.
- "PCP is fully supported in RHEL. You can open a case to get assistance from Red Hat support, or you can engage the community directly." *

Architecture

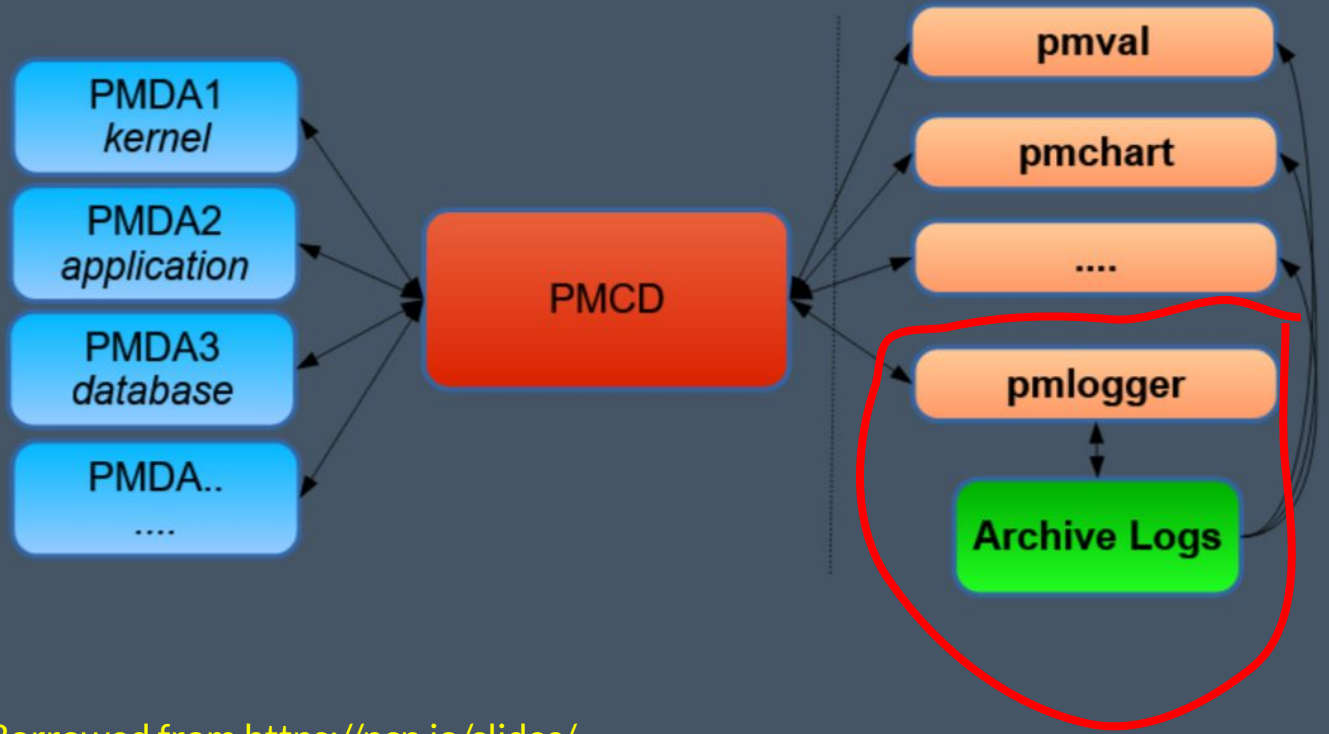


Borrowed from https://pcp.io/slides/

Live monitoring



PCP Archives



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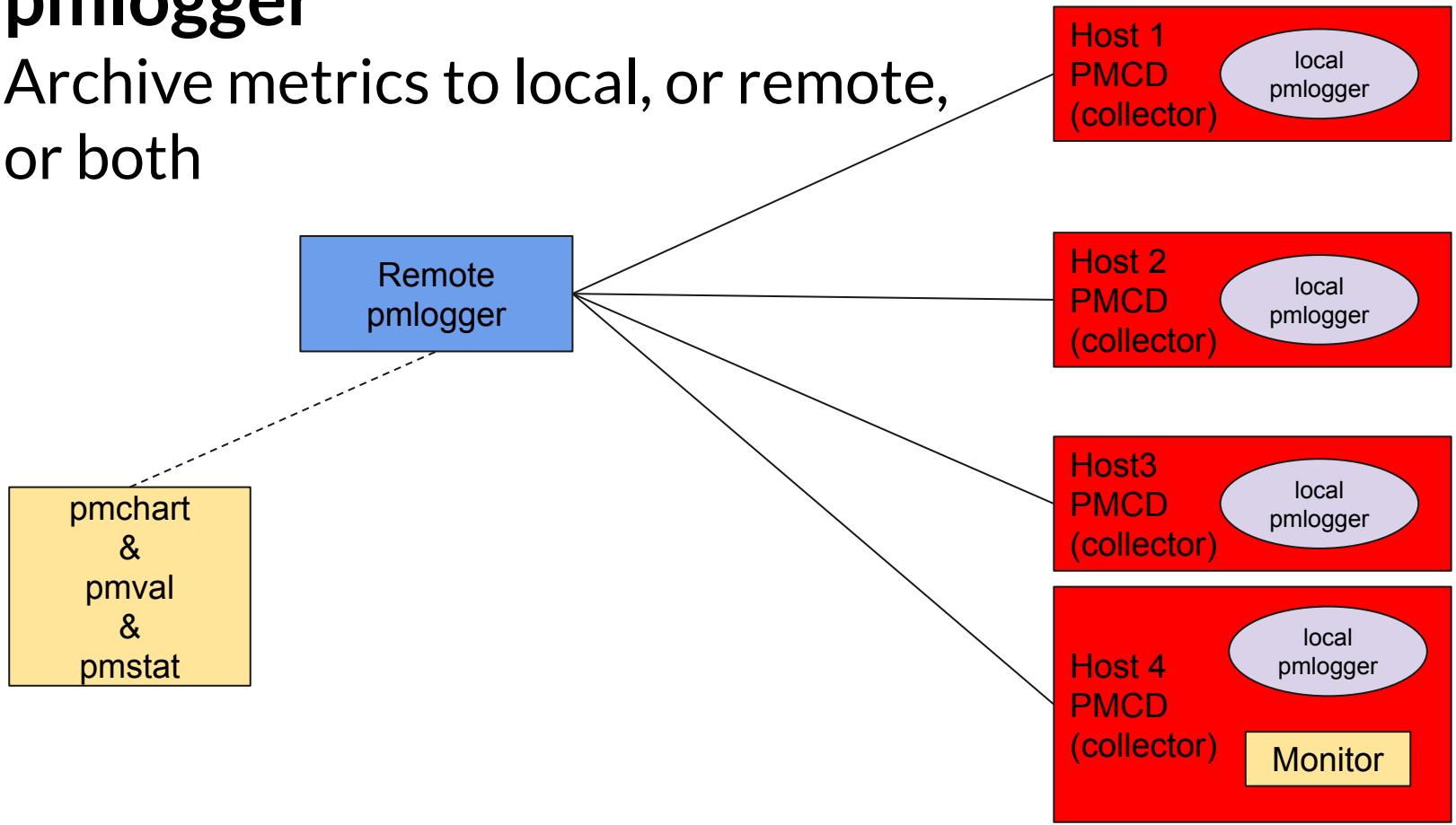
pmlogger

Archive metrics to local, or remote, or both



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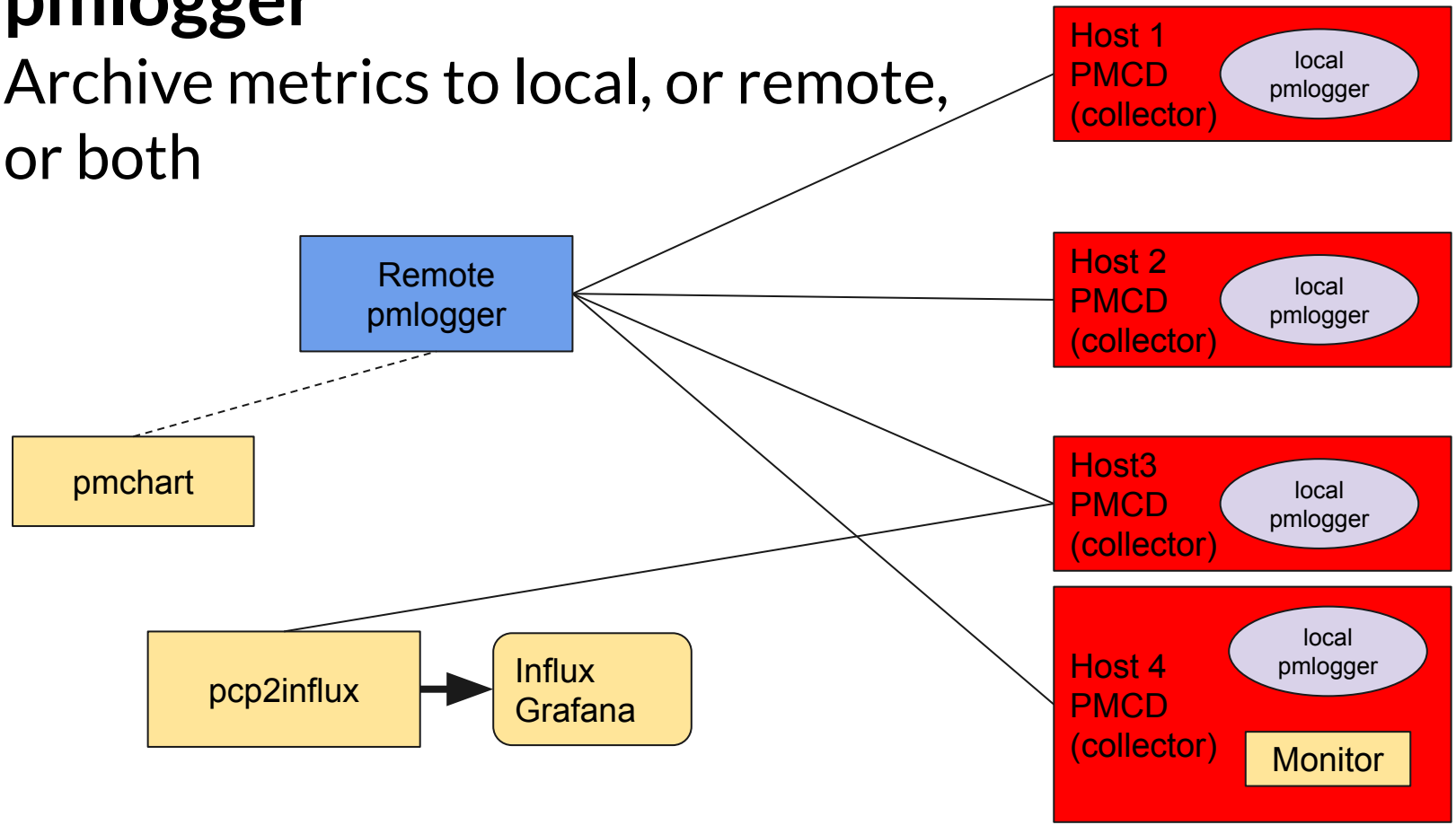

What's in the box

- Standard PMDAs (metric collection agents to get pretty much everything in the hierarchy on Linux
  - Optional PMDAs for most system stuff, including eBPF (BCC)
  - A Cisco router PMDA (telnet/screenscrape)
    - (No other network equipment PMDA)
  - Collector daemon, logger daemon
  - Various clients to view metric data
  - Performance metric Inference engine to generate events/alerts on metric content
  - Metric data converters, conduits, combiners connections to other frameworks
  - Lots more...

You can't paint yourself into a corner --

- Backward, forward, cross-architecture compatibility of data and communication is a design feature (play back data recorded 20 years ago)
- Inter-host connections can be authenticated and/or encrypted
    - Unauthenticated hosts can coexist with authenticated hosts
    - Ditto encryption

Included PMDAs

activemq ds389 **kvm** mounts openmetrics **root** summary
apache ds389log **linux** mssql oracle rsyslog trace
bash elasticsearch lmsensors mysql pdns samba trivial
bind2 gfs2 logger named perfevent sample txmon
bonding gluster lustre netcheck pipe sendmail unbound
cifs gpfs lustrecomm netfilter **pmcd** shping vmware
cisco gpsd mailq news postgresql simple weblog
dbping haproxy memcache nfsclient **proc** slurm **xfs**
dm **jbd2** mic nginx redis smart zimbra
docker json **mmv** nvidia roomtemp snmp zswap

(**bold** are enabled by default)

Outside contributions

- Searching "pcp pmda" on github:
  - BIND server PMDA
  - Cluster PMDA
  - Ruby bindings
  - C++ bindings
  - GoLang bindings
  - LIO PMDA
  - Ceph PMDA
  -

PCP Use Contexts

- As a strip-chart archiver/visualizer, as RRD/MRTG or Telegraf/Grafana
- As a meter/scope for looking at live measurements as they're happening
- As an alert generator based on thresholds and constraints (PMIE)
- As a data source for other collection/visualization systems
- Workflow:
  - Find the bump in Grafana
  - Zoom in with PCP tools, coordinate metrics and see what happened.

PCP Exporters

- Comes with exporters for:
  - Elastic
  - InfluxDB
  - .csv
  - Graphite
  - Json
  - Spark
  - .xlsx
  - XML
  - Zabbix
- Also -- contrib project: pcp2pdf, a report generator

pmlogger makes PCP *archives*

- PCP archives can also be made by other recorders, importers, API inputs, etc
- Various archive readers/displayers can be coordinated in time, and played, paused, rewind, fast-forwarded like your digital video recorder
- PCP archive files are copyable, combinable, extractable, etc
  - `pmlogextract`

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