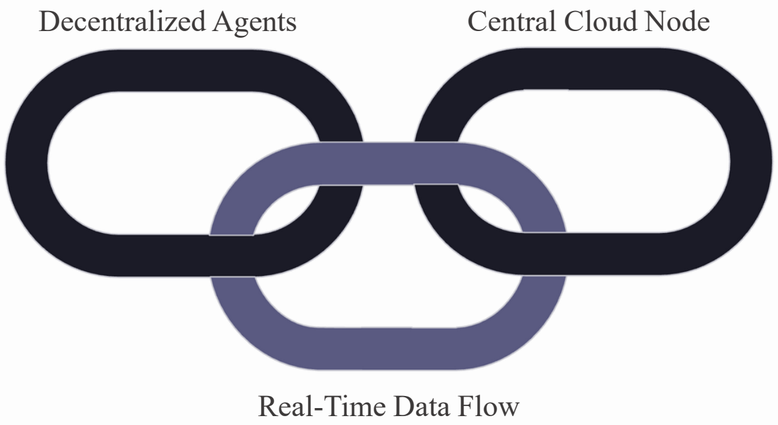
Netdata: Real-time Monitoring and Observability

Netdata is an open-source, distributed, real-time observability platform for infrastructure and applications. It automatically collects system and application metrics at per-second granularity, providing instant dashboards and AI-assisted analysis with virtually no configuration.

Extremely lightweight, Netdata runs on bare metal, VMs, containers, or Kubernetes. It auto-discovers hardware, OS, and application metrics, generating out-of-the-box interactive charts. Its real-time streaming architecture ensures metrics flow from the Agent to its dashboard in about 1 second, allowing immediate visibility into issues.

Netdata Architecture: Decentralized and Scalable



Netdata’s architecture centers on the Netdata Agent on each monitored node. This single daemon runs on various operating systems, collecting metrics via built-in collectors and custom plugins. All metrics are ingested into Netdata’s fast, custom time-series database, providing efficient short- and long-term storage.

Agents operate independently, but multiple Agents can connect to Netdata Cloud or Parent nodes for centralization. This distributed setup allows Agents to stream metrics live, aggregating data for central monitoring. Netdata’s horizontally-scalable design ensures agents remain autonomous while pushing data to clusters if connected.

Interactive Dashboards

Netdata provides rich, interactive web dashboards by default. Once the agent is running, you can immediately open its local UI to see live charts of all detected metrics. Dashboards are fully interactive, allowing users to zoom, enable/disable dimensions, and inspect metric trends in real time.

Netdata automatically groups metrics into logical sections (CPU, memory, disks, network, containers, applications) and auto-discovers new services. Each chart is generated without manual configuration, providing instant, interactive views for troubleshooting. Dashboards can also be customized and shared via Netdata Cloud.

Comprehensive Metric Monitoring

Netdata monitors a comprehensive set of metrics across your systems, offering high-resolution, high-cardinality data. This broad coverage provides full visibility into system health and application performance.

System-Level Metrics

- Memory usage (free, cached)
- CPU utilization (per-core)
- Disk I/O and latency
- Load averages, running processes

Network Metrics

- Bandwidth (in/out per interface)
- Packet rates, TCP connections
- Socket counts, TCP state distribution

Applications & Services

- Web servers (Apache, Nginx)
- 800+ built-in collectors
- Databases (MySQL, PostgreSQL)
- Container runtimes (Docker, Kubernetes)

Logs

- Tail and parse log files
- Report log volumes
- Error counts in real-time

Alerting & Notifications: Proactive Issue Resolution

Netdata includes a built-in health monitoring and alerting engine with hundreds of pre-configured alarms. These cover system and application metrics out of the box, such as high CPU usage or low disk space.

Intelligent Alarms

Alarms are based on thresholds, statistical patterns, or ML baselines, with sensible default values that can be customized or silenced.

Notifications

Notifications can be sent via email, Slack, PagerDuty, Discord, Microsoft Teams, and other webhook-capable channels.

Intelligent Engine

The alert engine collects metrics at 1-second resolution, applying hysteresis to avoid flapping, with severity levels and escalation policies.

Netdata Cloud offers centralized notification configuration, deduplication, and integrations. The system's intelligence ensures proactive troubleshooting, alerting you to unusual behavior before it escalates.

Advanced Features: Beyond Basic Monitoring

Netdata offers advanced capabilities that extend beyond basic monitoring, making it a comprehensive telemetry hub.

- **Machine Learning / Anomaly Detection:** Uses unsupervised ML to automatically detect anomalies in every metric, flagging sudden deviations without manual thresholds.
- **Metrics Streaming:** Exports metrics to other systems (Prometheus, Graphite, InfluxDB) for long-term storage or analytics.
- **Custom Data Collection:** Extends collection via custom plugins in any language, integrating with virtually any data source.
- **REST API:** Exposes a full REST API for automation and integrations, allowing programmatic access to metrics and alerts.
- **Central Streaming Clusters:** Supports active-active clustering of Parent nodes for high-availability and zero single-point-of-failure.

Netdata's ML-based anomaly detection in action, highlighting a spike in network metrics.

Netdata Cloud: Centralized Management

Netdata Cloud is a SaaS management layer that connects multiple Netdata Agents, providing a single pane of glass for monitoring many nodes. It offers centralized alerting, long-term storage, and multi-node aggregation.

Centralized Alerts

All alerts from agents flow into one place, with deduplication and notifications via Slack, PagerDuty, etc.

Collaboration & Access

Supports role-based access control, team collaboration, and sharing of custom dashboards.

Longer Data Retention

Stores data much longer than standalone agents, enabling historical trend analysis across nodes.

Netdata Cloud transforms Netdata from a single-node monitor into a comprehensive observability platform, ideal for multiple hosts or teams.

Use Cases: Real-World Applications

Netdata is ideal for instant troubleshooting and DevOps visibility. Its real-time capabilities make it invaluable for various scenarios.

1

Detecting Anomalies

Catches CPU spikes, memory leaks, disk I/O storms, and network congestion live, with ML highlighting unusual patterns.

2

Containerized Environments

Excels at monitoring Docker containers and Kubernetes pods, auto-discovering and tracking resource usage.

3

DevOps Pipelines

Integrates into CI/CD for regression monitoring, capturing and storing dashboards for offline analysis.

4

Baseline Performance

Establishes baselines by recording every metric, allowing replay of data to understand normal behavior and set intelligent alerts.

Netdata's instant setup means systems can be instrumented on-the-fly without complex configuration, making it suitable for both production and development environments.

Installation & Setup: Quick and Easy

Installing Netdata is extremely simple, with various methods available for different platforms, ensuring minimal configuration is needed to start monitoring.

Linux (Kickstart Script)

```
wget -O /tmp/netdata-kickstart.sh https://get.netdata.cloud/kickstart.sh
&& \sh /tmp/netdata-kickstart.sh
```

This script detects your OS, installs dependencies, and sets up Netdata with automatic updates. It can optionally connect to Netdata Cloud.

Docker

```
docker run -d --name=netdata \--pid=host --network=host \-v
netdataconfig:/etc/netdata \-v netdatalib:/var/lib/netdata \-v
netdatacache:/var/cache/netdata \-v /:/host/root:ro,rslave \-v
/etc/passwd:/host/etc/passwd:ro \-v /etc/group:/host/etc/group:ro \-v
/etc/localtime:/etc/localtime:ro \-v /var/log:/host/var/log:ro \-v
/var/run/docker.sock:/var/run/docker.sock:ro \-v /run/dbus:/run/dbus:ro
\--cap-add SYS_PTRACE --cap-add SYS_ADMIN \--security-opt
apparmor=unconfined \netdata/netdata
```

The Docker image runs Netdata with necessary permissions to monitor host metrics, accessible via http://[host]:19999.

Netdata also provides a Helm chart for Kubernetes, and supports Windows, FreeBSD, macOS, and appliances like pfSense with dedicated installation guides. The initial setup time is only a few minutes.

Security Considerations for Netdata

Netdata's dashboard is publicly readable by default on port 19999, necessitating careful security planning. Netdata offers multiple layers of protection to secure your monitoring environment.

Authentication

Supports HTTP auth and role-based access via reverse proxies like Nginx or Apache, including SSO integration.

Allow Lists

Restrict access to specific IPs or hostnames, and control per-feature access (e.g., view-only dashboards).

Read-Only Mode

Disable configuration editing and lock down the Metrics streaming API for external users.

SSL/TLS & Reverse Proxy

Enable HTTPS on Netdata's internal server or run it behind a TLS-terminating proxy for enhanced security. It's best practice to run Netdata on a private management network or behind a VPN.

Always avoid direct exposure to the internet. Use firewalls, VPNs, or proxy authentication. Netdata's documentation provides examples for Nginx and HAProxy to enforce login and TLS.

Integration & Export Capabilities

Netdata is designed to complement existing monitoring stacks, offering rich integration and export options for various tools and databases.

Prometheus

Supports both scraping and push, allowing long-term storage in Prometheus or Thanos while using Netdata for real-time collection.

Grafana

Integrate Netdata using its data source plugin to query Netdata (via Cloud or direct) for visualizations in Grafana dashboards.

Graphite/InfluxDB/Time-series DBs

Connectors for Graphite, InfluxDB, Elasticsearch, TimescaleDB, and others enable archiving Netdata data at desired intervals.

Other Integrations

Send metrics to log analysis tools (Kafka, Splunk) and alerting systems (PagerDuty). Netdata also offers APIs for UI chart snapshots and custom automation.

Netdata can act as a metrics collector feeding various backends or consume metrics via Prometheus exporters, fitting seamlessly into diverse observability architectures.

Netdata vs. Other Monitoring Tools

Netdata stands out for its real-time, high-resolution monitoring, offering a turn-key solution compared to other tools.

Netdata vs. Prometheus

Netdata is easier to set up, auto-configures dashboards, and provides high-resolution, per-second data without sampling. Prometheus is a powerful TSDB and query engine, often used for long-term storage with Netdata exporting to it.

Netdata vs. Nagios

Netdata offers continuous, 1-second granularity monitoring with auto-discovery and an interactive UI. Nagios relies on periodic checks and manual plugin configuration for simpler availability checks.

Netdata vs. Zabbix

Netdata provides higher granularity (1s vs. Zabbix's 30s default), is lighter-weight, and has 800+ out-of-the-box integrations. Zabbix offers flexible but often manual alert setup and relies on user-defined templates.

Netdata complements existing tools by filling the real-time, high-fidelity niche, allowing users to leverage its UI for fast troubleshooting while exporting metrics for long-term retention.

Resources & Community

Netdata boasts a strong open-source community and comprehensive documentation, providing ample support for users.

Documentation

The official Netdata Docs site (learn.netdata.cloud) offers comprehensive guides on installation, features, and administration.

GitHub

The Netdata Agent code and documentation are available on GitHub (github.com/netdata/netdata) for issues, source viewing, and contributions.

Community

Engage with the active Community Forum (community.netdata.cloud) and Discord channel for real-time chat and support from developers and other users.

Tutorials & Blog

Access how-tos, case studies, and deep dives on the Netdata blog, along with "getting started" material in the Learn Academy section.

For enterprises, Netdata offers paid support subscriptions with guaranteed SLAs and advanced features, complementing the free Community plan.

Demo: Netdata

Netdata demonstration video

Thank You!

We appreciate your time and attention. We are now ready to take any questions you may have.