A Scalable Network Monitoring System as a Public Service on Cloud

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Network Monitoring System

- A system that constantly monitors network for failing components and notifies the network administrator in case of outages.

We have a problem!
Network Monitoring System

• There are several open source NMS e.g. Nagios, Cacti, OpenNMS, GroundWork Monitor, MRTG
Our first attempt: NetHAM

- A software that runs on a dedicated Linux server.
- The core engine is based on open source software.
- Provides a user-friendly web interface.
- Summarized the status of the network using graphic.
- Has been used by 100s of users including schools, libraries, hospitals, small enterprises.
Lessons learned

- NetHAM still has limitations
  - Need a dedicated server.
    - may not worth for very small networks
  - Scaling limitation.
    - cannot scale out
  - Single point of failure.
    - no redundancy
Basic Idea
Basic Idea

Oh really!?
Basic Idea

But if all the gateways are down, the monitoring server will no way be able to send out a notification.
So, in stead of this
Basic Idea

We do something like this.
Basic Idea

With this approach we will never miss the bad news.
Basic Idea

This leads to a Cloud monitoring platform…

Sir, you got to see this!!

Huh
Our New approach

NetHAM nano

- SaaS. No installation!
- Extremely user-friendly
- Highly scalable
- Self-managed
- Redundant / Fault tolerant
- Zero downtime
Inside of the cloud

- Scalable
- Fault-tolerance
- Self-managed
Homogeneity of NetHAM nano cloud

All NetHAM nano nodes are exactly the same!

NetHAM nano also works on a single node.

Scale out by adding nodes!
Homogeneity of NetHAM nano cloud

When pooling as a cluster, some nodes may have some functionalities disabled.
Failover : Agent Layer

- Failover mechanism is implemented on every layer.
Failover : Data Store Layer

- Database redundancy → no down time for the data store

.. scale out by adding shard router
Failover : Node Layer
Failover : Node Layer
Failover: Node Layer
The current testbed

5 VMs at Bangkok-Thai Tower

2 VMs at CAT
Bangrak

2 VMs at CAT
Nonthaburi

1 Android Tablet
mobile IP (assigned dynamically)

1 PC at NTL

1 PC at OQC (private IP)

2 Raspberry Pi
Self Monitoring

While monitors others, NetHAM nano is also monitoring itself!

Self monitoring performs in an auto-configured & scalable & fault tolerant manner.

Every node is monitored by at least one neighbor node. Like a usual host check, cross monitoring can be adapted dynamically according to a cloud manager.
Possible NetHAM nano Nodes

- Android Phones / Tablets
- Server / Desktop PC
- Virtualization nodes e.g. Virtualbox, VMWare, Amazon EC2
- Embed Linux devices e.g. Raspberry Pi
Platform-Specific plugins

• Server
  – Network service: PING, HTTP, FTP, SNMP, TCP/UDP, DNS
  – Device statistic: CPU, memory load
  – Network Interface: bytes in/out, operational status

• Home Agent
  – Environment: Temperature, Humidity
  – Network: wifi, devices identified by mac addresses

• Mobile
  – GPS coordinate
  – Accelerometer, Gyrometer, Proximity sensor, Camera
NetHAM nano Front End

- SSL web integrate with Facebook Application Platform.
- Real-time status update via the push engine.
- Hassle-free user interface.

https://apps.facebook.com/nethamnano
Front End

- Network topology with auto graph layout
- Interactive chart component with scroll & zoom capability
Some future use cases:
Network monitoring system

- To monitor network devices such as switches, routers, servers.
- To monitor remote service e.g. PING, HTTP, SNMP (more to be added)
- Support distributed monitoring via multiple agents.
- Suitable for small networks, small offices, websites etc.
Some future use cases:
Home applications

• NetHAM nano can be used to monitor home networks via usual ADSL modems.
• By doing a port forwarding, NetHAM nano could answer these questions:

  Will be even more exciting if we have a home agent!
Some future use cases:
Smart energy

- By using a smart meter, it is possible to monitor home electricity consumption the same way as Google Power meter does.
- Monthly electric bill can be predicted.
- Alerts when there’s anything wrong with the electric usage patterns.
Some future use cases:
Mobile applications

- By imitating the standard NetHAM nano agent, we can have a compact agent run on mobile phones and tablets.
- Instead of checking the remote services, a compact agent checks their sensors.
- NetHAM nano can track device’s position, speed, acceleration etc and display on the current UI with a map view.
Some future use cases:
Information monitoring

- NetHAM nano can gather information from several sources and notify users according to their current locations.

NetHAM nano
- “It’s going to rain in half an hour!”
- “Leave soon if you don’t want to be caught in a traffic jam.”
- “Diesel price increases tomorrow at 5:00AM.”
Project Status

- NetHAM nano project is under development.
- We are looking for places to deploy nodes to support multiple-point monitoring from different regions/countries.
- We are looking for innovative applications e.g. home monitoring, location-based service, specific information retrieval for end users e.g. weather alert, traffic alert, disaster report etc.
- Contact us at: nano@netham.in.th
Thank you