INFN-GRID Testbed Monitoring System

Roberto Barbera (barbera@ct.infn.it)
Paolo Lo Re (lore@na.infn.it)
Giuseppe Sava (sava@ct.infn.it)
Gennaro Tortone (tortone@na.infn.it)

HEPIX-HEPNT Sixth Joint Meeting
Catania (Italy) 15-19 April 2002

- Inside the INFN-GRID testbed, we have been working to develop a monitoring system.

- This statement was one of our reference points:

(from "Requirement of network monitoring for the GRID" - by Robin Tasker)

"Immediate network monitoring: … a **single view/access point** of the available tools needs to be produced to allow a GRID user access **to determine the "health" of the network**. Such a snapshot of the network will likely include route information between specified end points; the characterisation of the network using, for example, pathchar; and the means of measuring throughput …. The pre-testbed sites are encouraged to develop this concept to demonstrate capability and to allow WP7 to further refine the ideas based upon their experience and input from the users of these products."

Other general requirements were:

- The system for farm monitoring (LAN) and fabric monitoring (WAN) should be the same.
- The system should be scalable and independent of the nature of the parameters to be monitored.
- The system must have a web user interface and must be secure.
- The system must be easy to install, configure and maintain.

The INFN choice: NETSAINT

• Netsaint is a network monitoring tool (open source)
written in C, developed by Ethan Galstad and designed
to run under Linux, but there are also portings for Compac
True64, Solaris, HP-UX, etc., (www.netsaint.org).
Some of its features include:
• simple plugins design that allows users to easily develop
their own service checks.
• monitoring of network services (FTP, HTTP,SSH, …)
• monitoring of host resources (disk usage, processes,…)
• ability to define network host (or device) "hierarchy" usin
"parent" host, allowing detection and distinction between
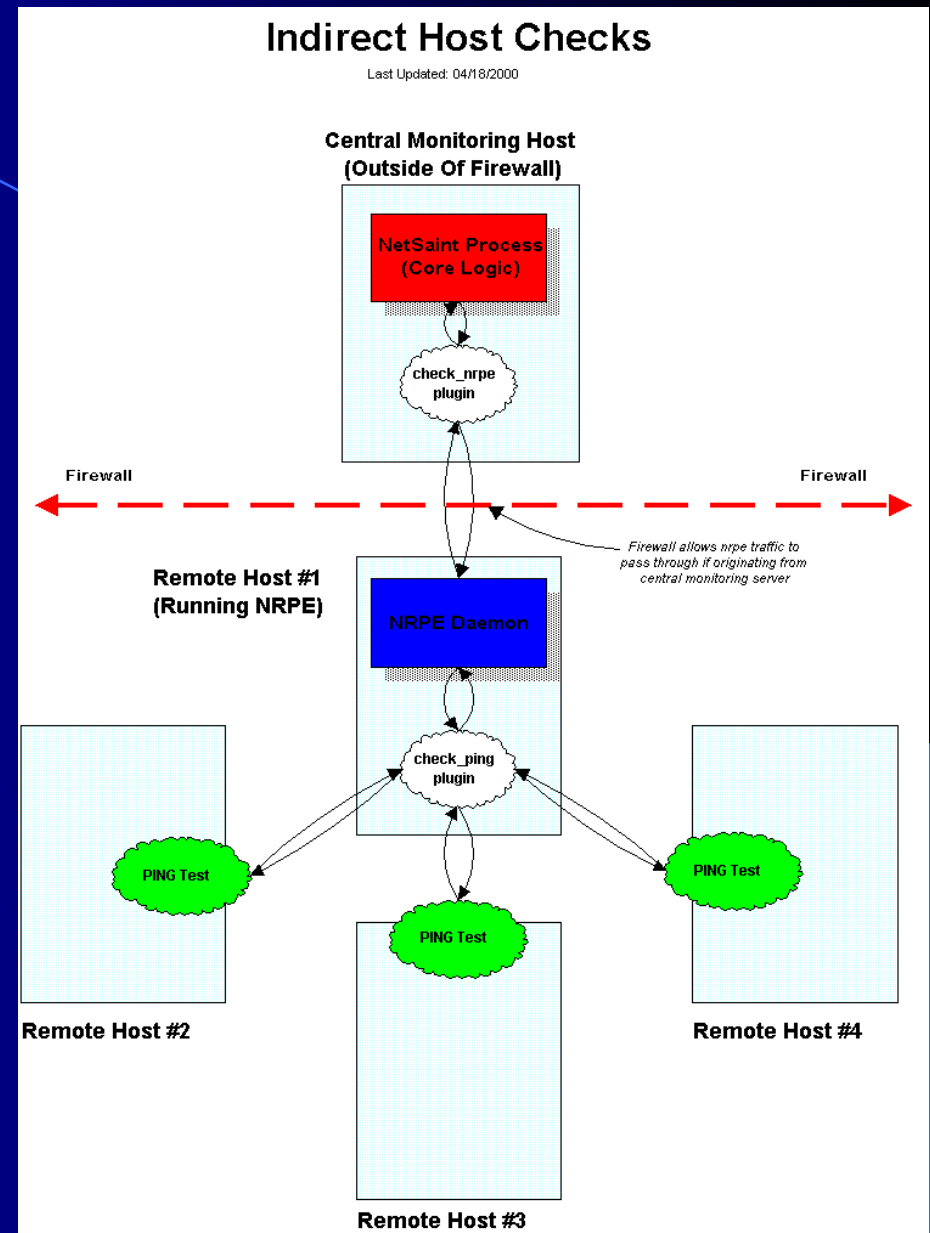hosts that are down and those that are unreachable.

Direct host check: Netsaint runs a specific plugin to read the value of a parameter:
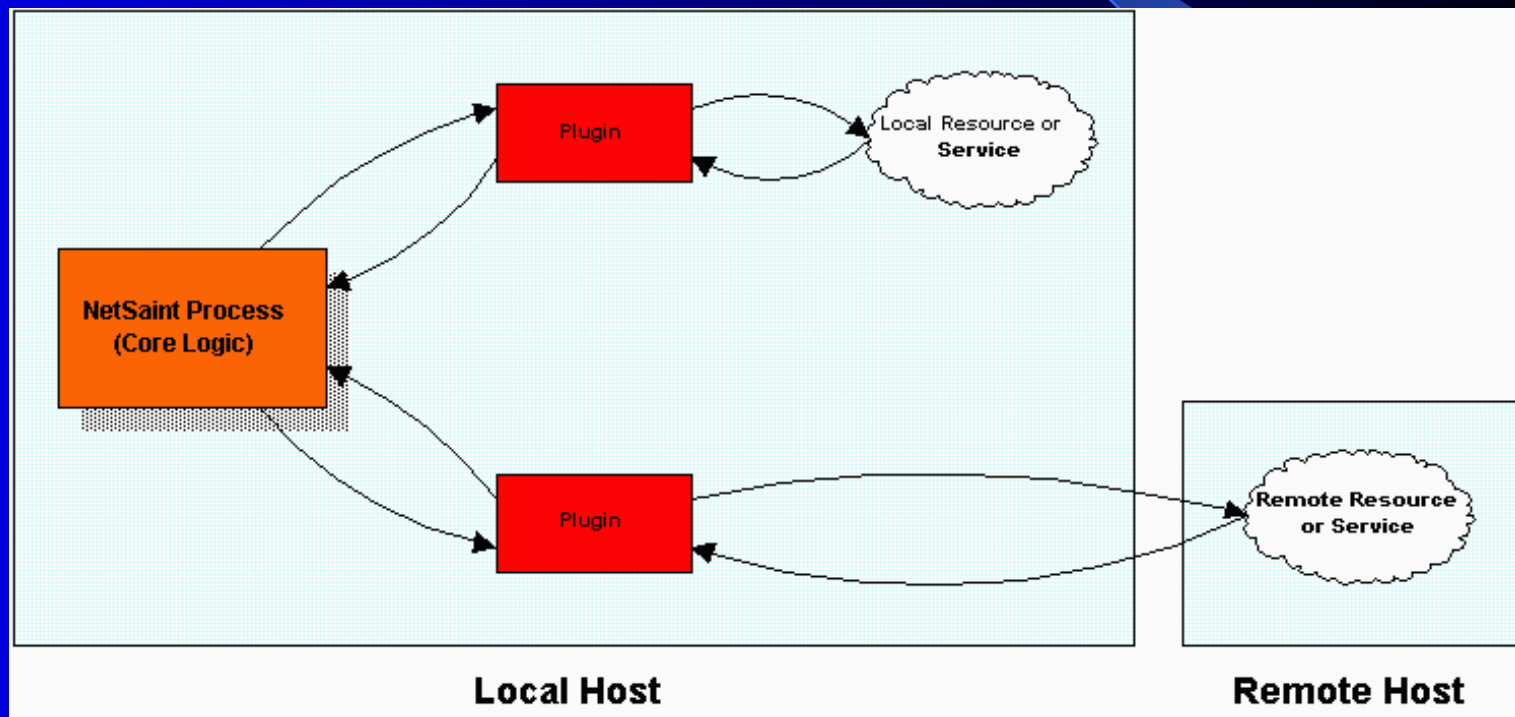
Indirect host checks

- There are some "private" resources/services, like disk usage, processor load, number of users,etc, on remote hosts that are not accessible to the public.
- These indirect checks require an intermediate agent.
- They are useful to monitoring services and hosts behind firewalls.
- An indirect check is possible with the addon NRPE (Netsaint Remote Plugin Executor).
- The host Netsaint runs a plugin called check_nrpe which talks with the agent NRPE on the remote host.
- NRPE performs the host check and returns the results back to the central server.

The diagram shows an indirect host check performed by using the nrpe daemon and check_nrpe plugin.

Indirect Host Checks
Last Updated: 04/18/2000

Central Monitoring Host
(Outside Of Firewall)

NetSaint Process
(Core Logic)

check_nrpe
plugin

Firewall   Firewall

Firewall allows nrpe traffic to
pass through if originating from
central monitoring server

Remote Host #1
(Running NRPE)

NRPE Daemon

check_ping
plugin

PING Test   PING Test

PING Test

Remote Host #2   Remote Host #4

Remote Host #3

Other features.

- contact notifications when service or host problems occur (via email or user defined method)
- ability to define event handlers to be run during service or host events for "proactive" problem resolution
- logging mechanism and automatic log-file rotation
- optional plugins to send SNMP queries to host or network devices (router, switches, …);
- web interface to view current network status, notifications and problem history, logfile, …

Role of Netsaint fo GRID Monitoring

Our idea is to use NetSaint:

• to view a "snapshot" of the GRID Testbed

   resources status, services availability, network

   measurements (and job status)

• to receive notifications on host or service (or job)

   faults

• to view graphs of resource status, network

   measurements and job status as a function of
time

notifications: it's possible to define group(s) of users (site admins or production manager) to notify when a service (or a host, or a job) is in critical state;

event handlers: they are optional commands that are executed whenever a host or service state change occours; an obvious use of event handlers is the ability for NetSaint to proactively fix problems before anyone is notified;

plugin architecture: NetSaint does not include any internal mechanism to check the status of services (or hosts, or jobs); instead, NetSaint relies on external programs (plugins) to do all the monitoring activity; this feature allows users to easily develop their own service checks;

remote service checks - NRPEP addon: this addon is designed to provide a way for executing plugins on a remote host. The check_nrpep plugin runs on the NetSaint server and is used to send plugin execution requests to the NRPEP agent on the remote host. The nrpep agent will then run an appropriate plugin on the remote host and return the output to the check_nrpep plugin on the NetSaint server. All data in transit are in TripleDES encription format;

distributed monitoring - scalability: a possible usage of NetSaint is to install one NetSaint "sensor" (in barebone configuration) for each site to collect monitoring results from resources and one main NetSaint "collector" (in full configuration) to collect "groups" of monitoring results from sensors; this feature shows the "functionality overlap" that exists between NetSaint distributed architecture and GIIS/MDS GRID architecture;

Netsaint collector

INFN-GRID developments of Netsaint
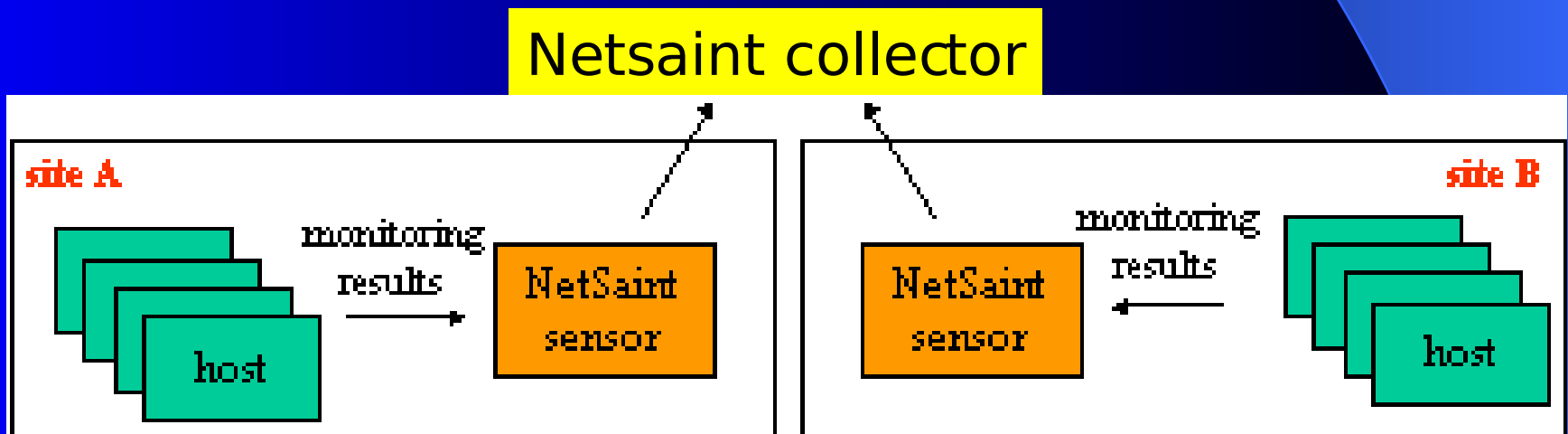
- **<u>Simple web portal with clickable geographic map</u>**

- **<u>graphs of resources (or network) monitoring results</u>**: we have developed a "wrapper" that parses the output of a plugin execution and insert monitoring values into a RRD (Round Robin Database - www.rrdtool.org). A user, from NetSaint web interface, can view daily, weekly, monthly or yearly graphs for a selected resource/service

- **<u>"LDAP based" plugin</u>**: another thread of development activities is the implementation of a plugin that will "pull" ("push") information from a MDS server, instead than from resources/services.

Current situation

NetSaint is the "official choice" of INFN Grid Project for monitoring of INFN Testbed 1

Collaboration is going to start with CNR on the use of NetSaint for network and fabric monitoring

Presently a NetSaint server is installed in Catania and checks approximately ~130 services on ~35 hosts

http://infngrid.ct.infn.it

(user: infn-tb - pass: guest)