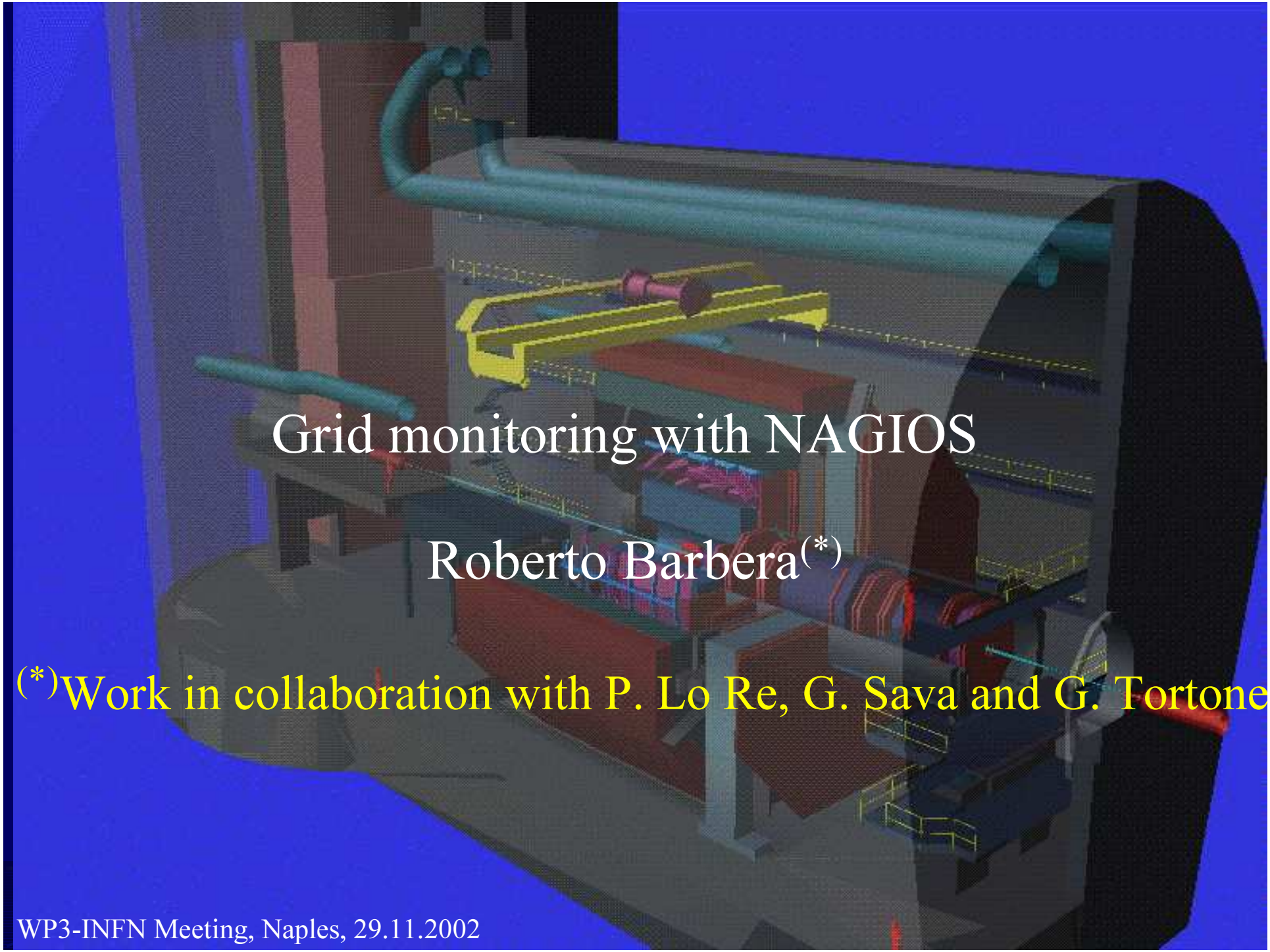

Grid monitoring with NAGIOS

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(*)Work in collaboration with P. Lo Re, G. Sava and G. Tortone

WP3-INFN Meeting, Naples, 29.11.2002

Outline

- Basic concepts for a distributed monitoring system
- The INFN choice: Nagios
  - Role of Nagios for Grid monitoring
  - INFN developments
- Present status of the INFN testbed monitoring system (live demo)

Basic concepts (goals)

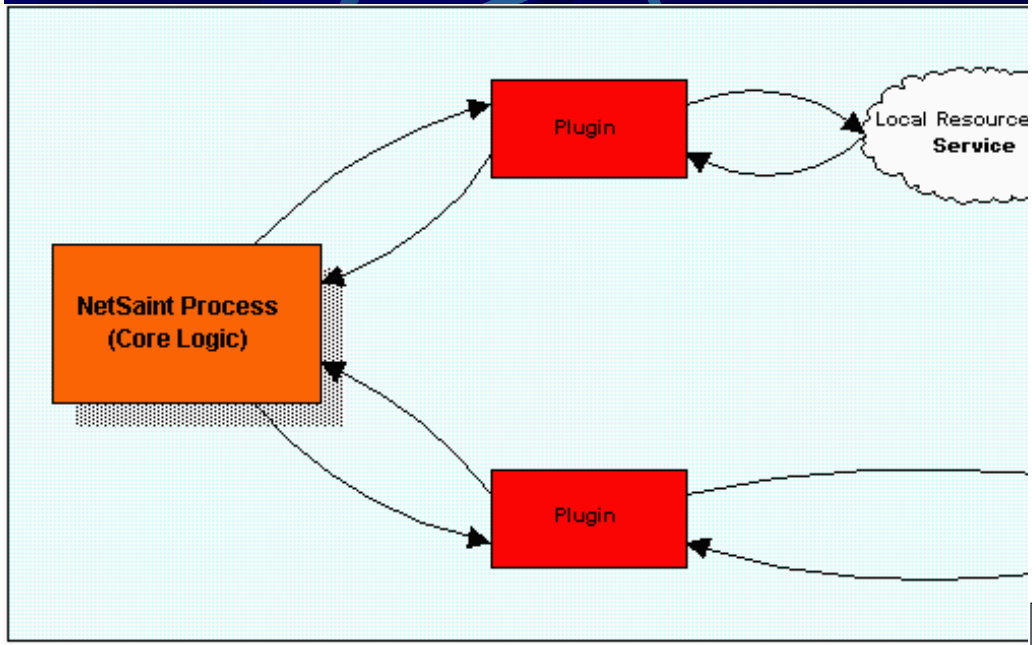
- In the era of GRID computing, farm (LAN) monitoring, fabric (WAN) monitoring, and job monitoring are three faces of the same problem.
- The system for all of them should be the same, or at least with the same front-end.
- The system must be scalable up to $O(10^{3\div4})$ nodes and $O(10^2)$ sites.
- The system should be independent of the nature of the parameters to be monitored and should behave in the same way for all of them.
- The system should not be dependent on a given information service. The front-end must be unique while the back-ends should be as many as possible (both ways).
- The system must have a "common" (web) user interface and must be "secure".
- The system must be easy to install, configure and maintain.

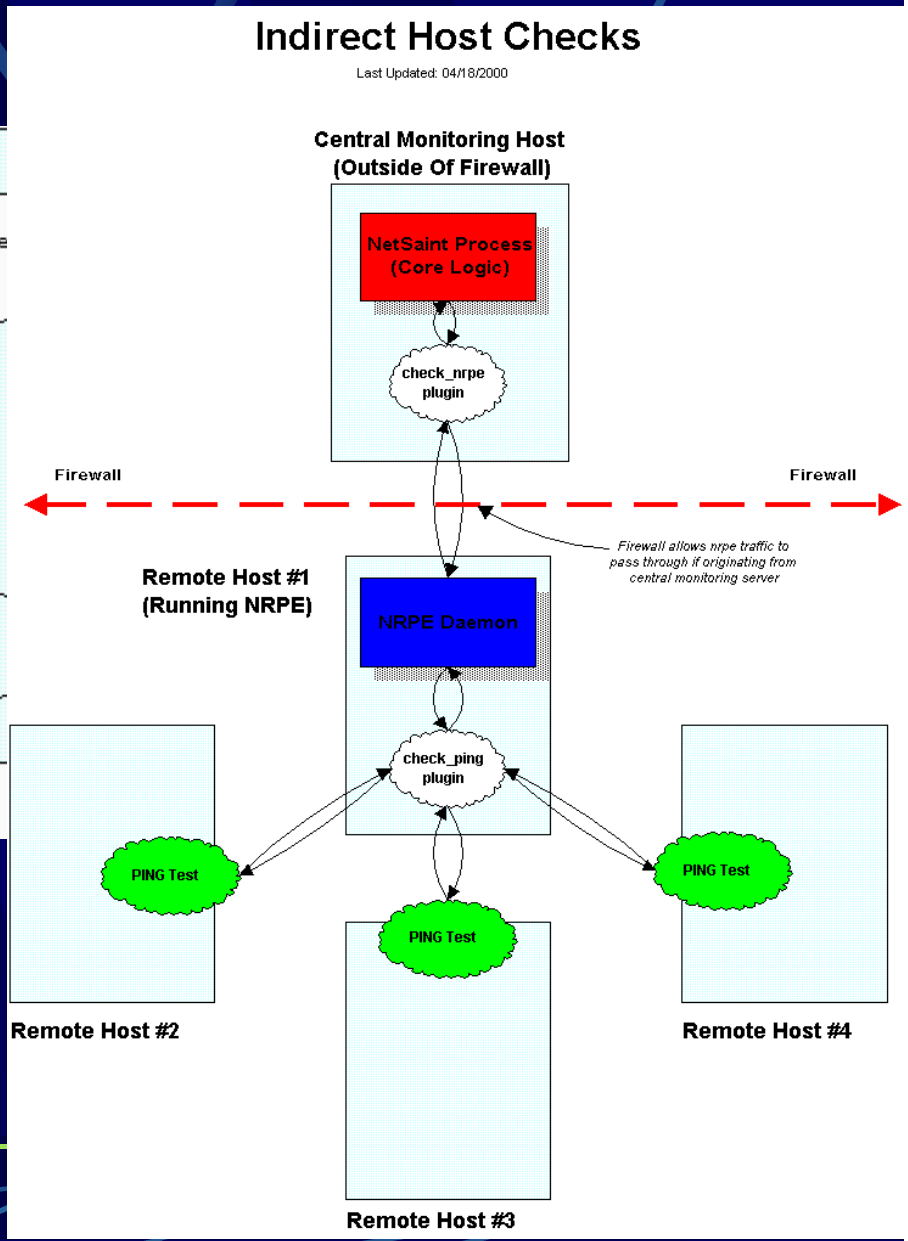
The INFN choice: Nagios (1)

Nagios is (not only) a network monitoring tool (open source) developed by Ethan Galstad and designed to run under Linux (although is known to be ported on many Unix flavours).

Some of its features include:

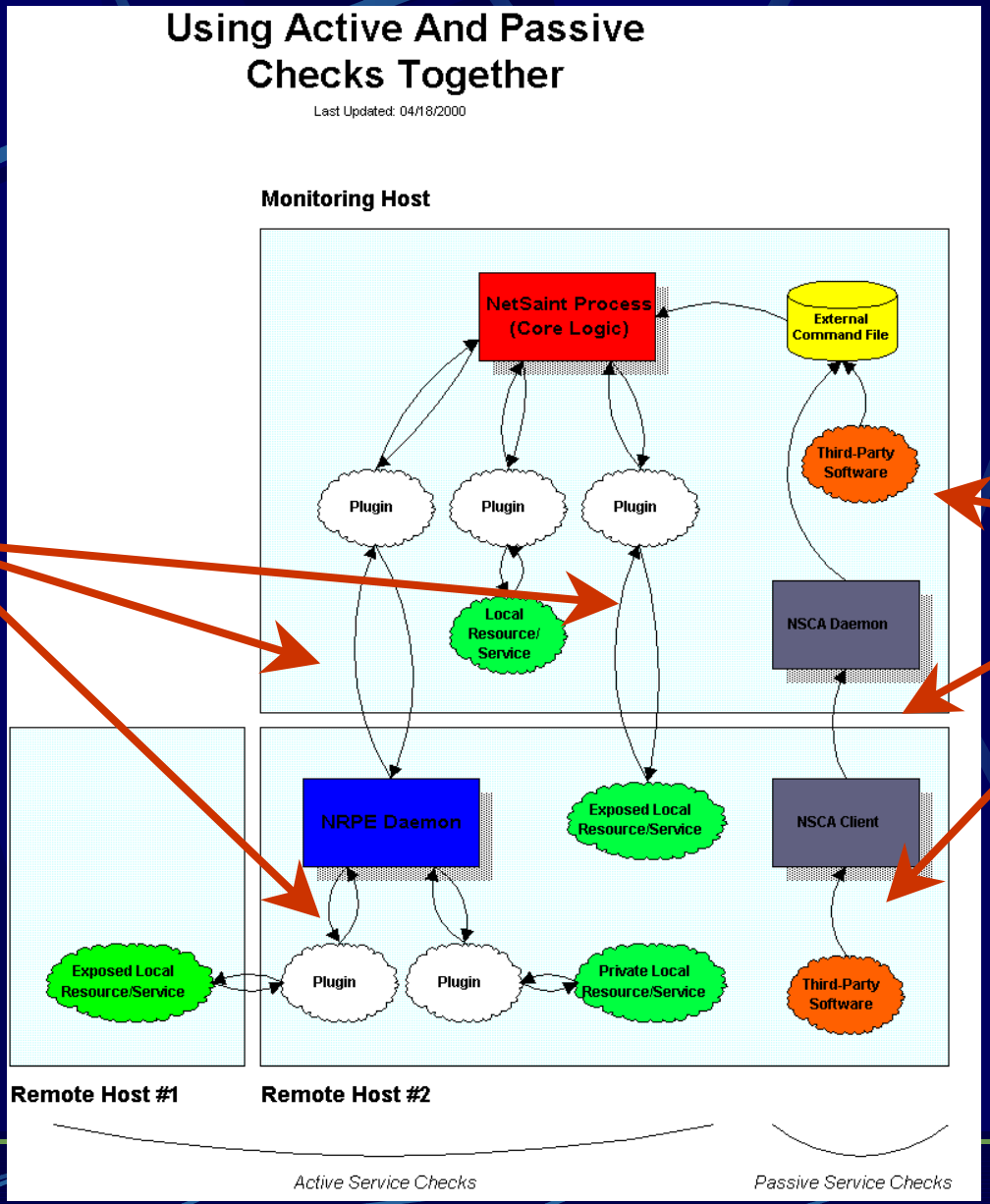
- simple plugins design that allows users to easily develop their own service checks
- monitoring of network services (FTP, HTTP, SSH, …)
- monitoring of host resources (CPU load/temp, disk usage, …)
- monitoring of job status (it is just a question of the right plug-in)
- ability to define network host (or device) "hierarchy" using "parent" host, allowing detection and distinction between hosts that are down and those that are unreachable
- distributed monitoring: a "central Nagios server" obtains check results from one or more "Nagios distributed servers".


Plugin
Local Resource
Service
NetSaint Process
(Core Logic)
Plugin
Local Host


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 #3
Remote Host #4

Active checks

Passive checks



The INFN choice: Nagios (2)

- 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 for view current network status, notifications and problem history, logfile, …

Role of Nagios for Grid monitoring

The idea is to use Nagios:

- 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

Interesting features of Nagios for GRID monitoring (1)

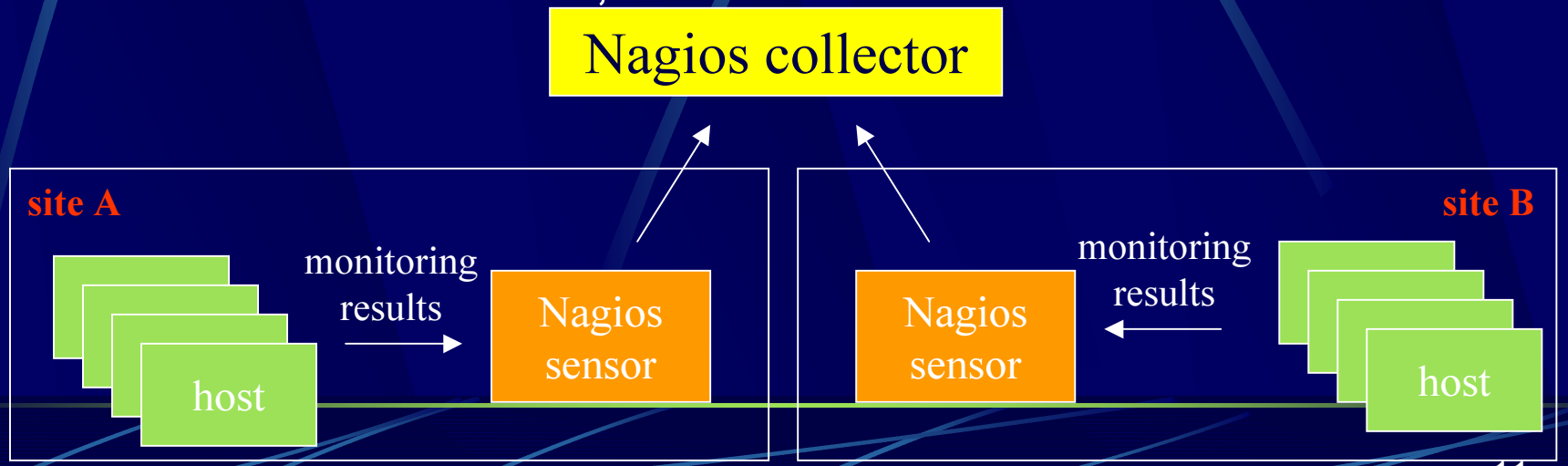
- **notifications**: it's possible to define group(s) of users (site admins or production manager) to notify when a service (or a host, or a job) is in critical state;
- **event handlers**: they are optional commands that are executed whenever a host or service state change occours; an obvious use of event handlers is the ability for Nagios to proactively fix problems before anyone is notified; another use is to log service or host events to an external database;
- **plugin architecture**: Nagios does not include any internal mechanism to check the status of services (or hosts, or jobs); instead, Nagios relies on external programs (plugins) to do all the monitoring activity; this feature allows users to easily develop their own service checks;

Interesting features of Nagios for GRID monitoring (2)

- **remote service checks - NRPEP addon**: this addon is designed to provide a way for executing plugins on a remote host. The check_nrpe plugin runs on the Nagios server and is used to send plugin execution requests to the NRPEP agent on the remote host. The nrpe agent will then run an appropriate plugin on the remote host and return the plugin output and return code to the check_nrpe plugin on the Nagios server. The check_nrpe plugin then passes the remote plugin's output and return code back to Nagios as if it were its own. All data in transit are in TripleDES encription format;
- **passive checks** : Nagios can process service check results that are submitted by remote hosts through a daemon that runs on the Nagios server and a client that is executed on remote hosts;

Interesting features of Nagios for GRID monitoring (3)

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



INFN developments of Nagios

- **clickable geographic maps**
- **graphs of resources (or network) monitoring results**: 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 Nagios web interface, can view daily, weekly, monthly or yearly graphs for a selected resource/service
- **"LDAP based" plugin**: 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

Nagios 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 Nagios for network and fabric monitoring

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

http://infn-tb:guest@giano.ct.infn.it