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Exposing open-source Nagios plug-ins thru CIM

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Disclaimer

- The information in this presentation is part of a work in progress
- This information is subject to change

Agenda

- Nagios
 - Architecture
 - Plug-ins characteristics
- Nagios-CIM Solution
 - Nagios-CIM integration
 - Nagios plug-ins thru CIM
 - Proposed framework
 - Indication Provider Implementation
- Demo
- Conclusions and future work






Why Nagios?

- Among the most used open-source monitoring tools
- Open and pretty simple plug-in based architecture
- Massive plug-in developers community
 - Enabling other management tools/frameworks to use these plug-ins thru a standard interface looks appealing
 - Nagios community plug-ins:
www.nagiosexchange.org

Nagios console

- This is the high-level view of a host services in Nagios Web page:

Service Status Details For All Hosts

Host ↑↓	Service ↑↓	Status ↑↓	Last Check ↑↓	Duration ↑↓	Attempt ↑↓	Status Information
fswin-1	NRPE-Test	CRITICAL	11-24-2007 10:00:12	0d 0h 8m 17s	1/3	CHECK_NRPE: Socket timeout after 10 seconds.
	Oracle Connections	CRITICAL	11-24-2007 10:01:09	0d 0h 7m 20s	1/3	CHECK_NRPE: Socket timeout after 10 seconds.
	PING	CRITICAL	11-24-2007 10:07:06	0d 0h 6m 23s	1/4	PING CRITICAL - Packet loss = 100%
	Sites Deviation	CRITICAL	11-24-2007 10:03:03	0d 0h 5m 26s	1/3	CHECK_NRPE: Socket timeout after 10 seconds.
localhost	Current Load	OK	11-24-2007 10:07:01	22d 18h 6m 40s	1/4	OK - load average: 4.79, 2.02, 0.77
	Current Users	OK	11-24-2007 10:07:58	57d 18h 42m 45s	1/4	USERS OK - 2 users currently logged in
	HTTP	 WARNING	11-22-2007 17:04:29	26d 3h 32m 30s	4/4	HTTP WARNING: HTTP/1.1 403 Forbidden
	MYSQLD	 CRITICAL	11-24-2007 10:00:41	8d 18h 54m 6s	4/4	CRITICAL ERROR - Unable to connect to database " on server '127.0.0.1'
	PING	OK	11-24-2007 10:06:38	57d 18h 41m 30s	1/4	PING OK - Packet loss = 0%, RTA = 0.52 ms
	Root Partition	OK	11-24-2007 10:07:34	1d 17h 12m 19s	1/4	DISK OK - free space: / 3685 MB (50% inode=84%):
	SSH	 OK	11-22-2007 17:07:07	22d 20h 25m 56s	1/4	SSH OK - OpenSSH_4.4 (protocol 1.99)
	Swap Usage	OK	11-22-2007 17:08:04	51d 19h 50m 1s	1/4	SWAP OK - 100% free (501 MB out of 501 MB)
Total Processes	OK	11-22-2007 17:09:01	51d 19h 49m 23s	1/4	PROCS OK: 62 processes with STATE = RSZDT	

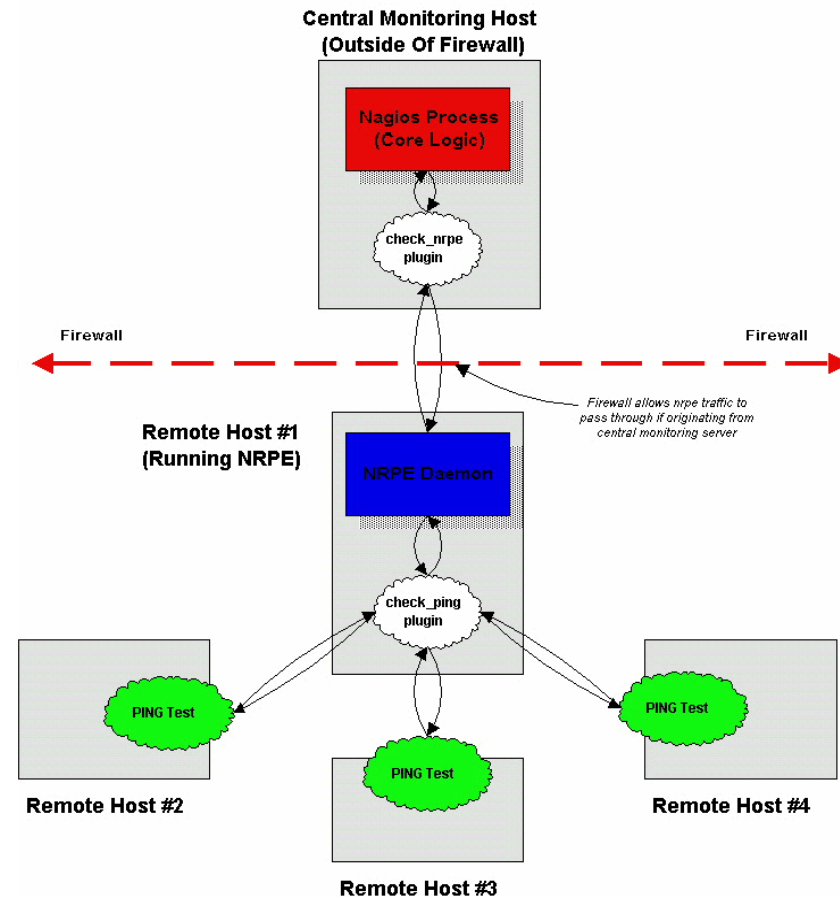
Nagios architecture

- 3 core building blocks:

- Core engine
 - components definition
 - orchestration
- Add-ons
 - firewalls bypassing
 - NSCA
 - NRPE
 - DB historical data
- Plug-ins
 - measuring work

Indirect Host Checks

Last Updated: 07-12-2001



[Picture Source: Nagios 3.0 online Documentation]

Nagios plug-ins

- Nagios acquires measurements only through plug-ins
- Almost anything that can generate output to the STDOUT is a potential Nagios plug-in
 - Required: **OK** | **WARNING** | **CRITICAL**
 - Optional: Raw Data – Statistical data
- Its output depends on received parameters
- The Nagios core engine is agnostic to the type and semantics of the reported metric



Nagios plug-ins demographics

- Some of them comes with Nagios official distribution
 - Examples: `check_http`, `check_disk`, `check_mem`, ...
- A huge percentage of them are developed by the community for special hardware monitoring, as well as for very unusual uses
 - `check_dell_sensors` (Dell chassis)
 - `oracle_writeaccess`
 - `check_pcoweb` (air conditioning)
 - 100+ for SNMP usage
 - 50+ for Windows monitoring thru NT NRPE version
 - ...

Nagios-CIM integration

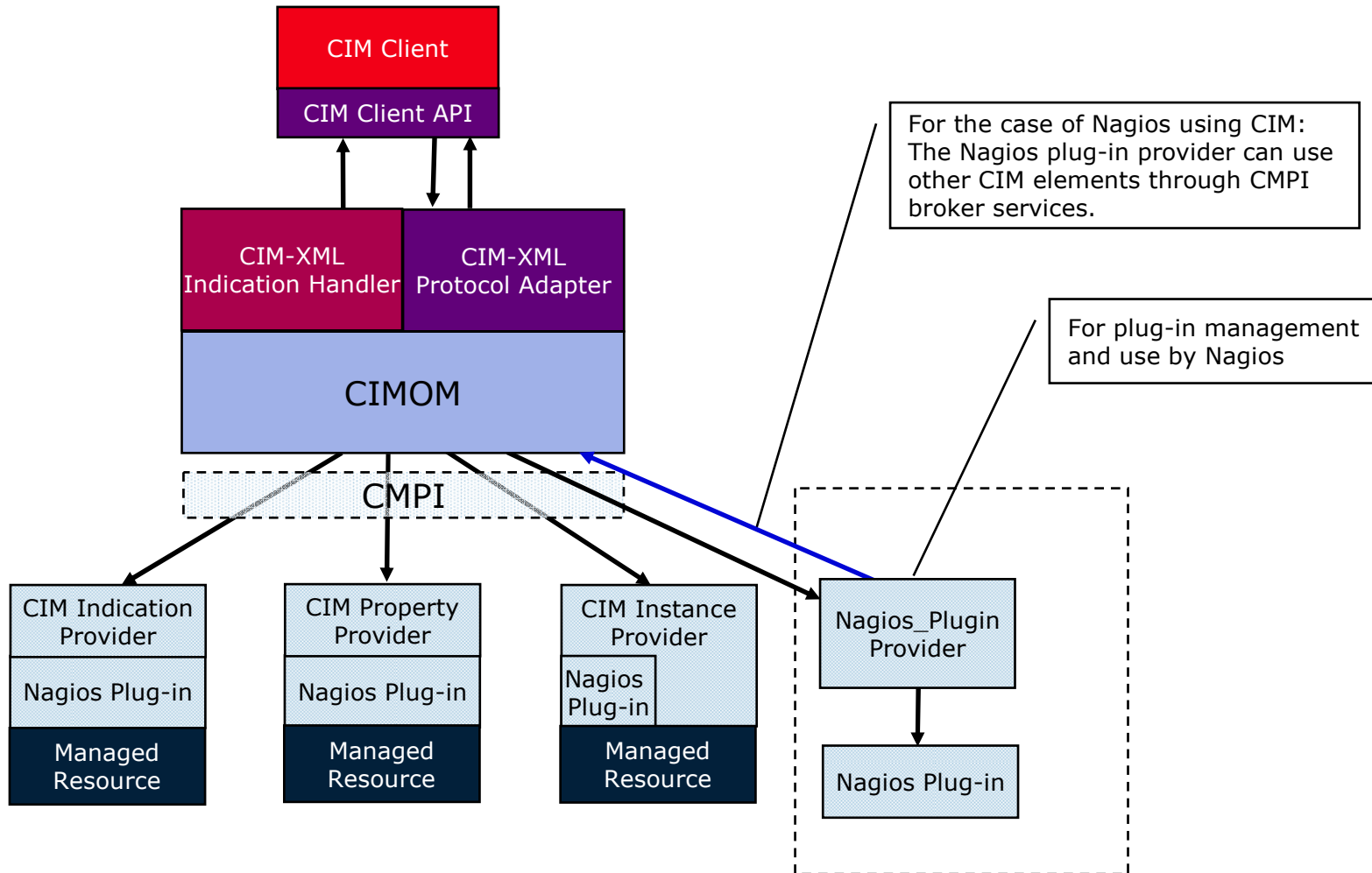
- Two aspects
 - Seamless utilization of Nagios plug-ins thru CIM
 - Utilization of CIM by Nagios
- This work is focused on plug-ins utilization thru CIM



Nagios plug-ins thru CIM

- Nagios plug-ins can be used to implement specific providers
 - Indication Providers (Alert indications)
 - Property Providers
 - Certain properties population in Instance Providers
- Different design approaches
- Plug-in usage should be seamless
- The provider-CIMOM interface should be CMPI

Nagios plug-ins thru CIM diagram





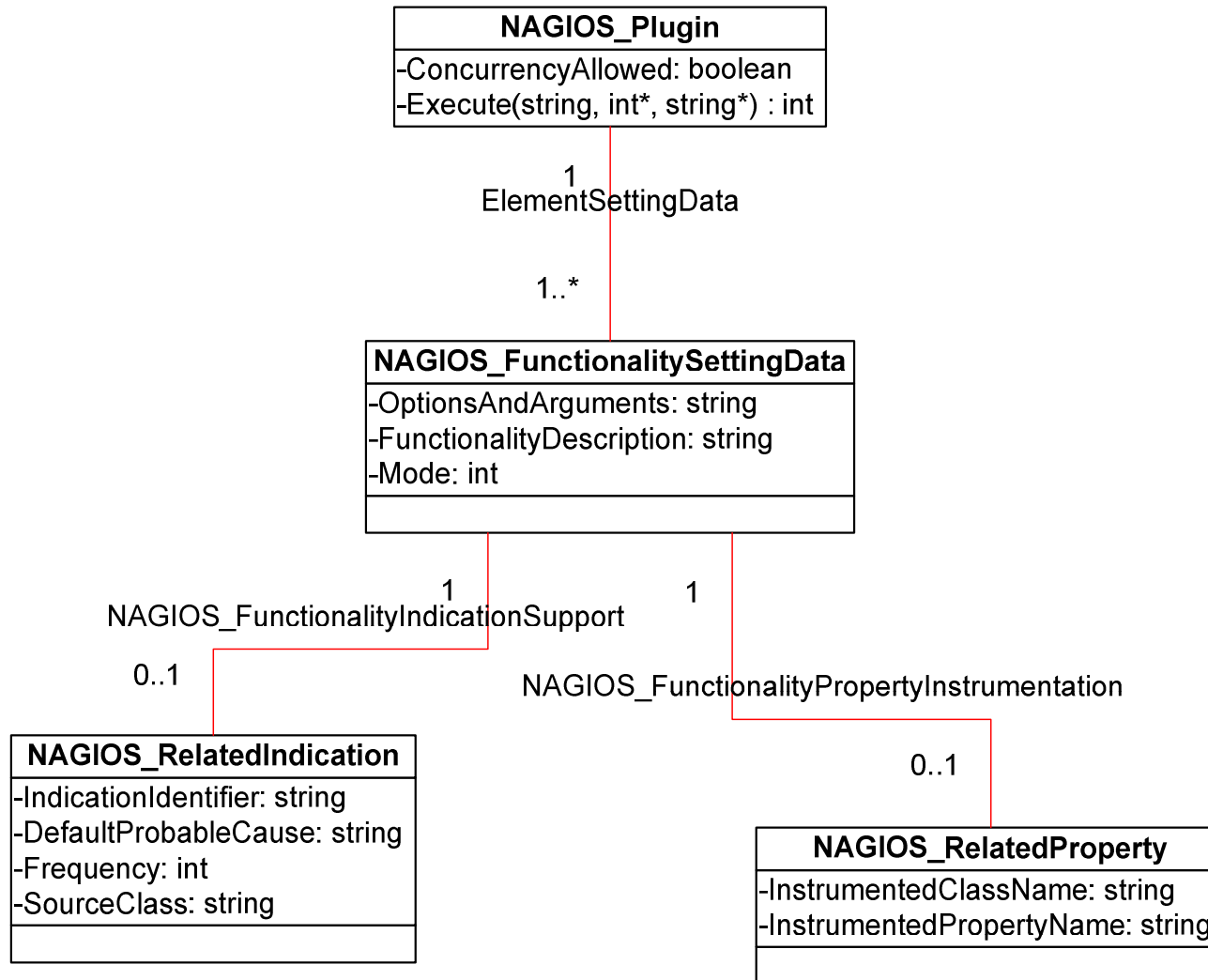
Nagios plug-ins considerations

- A plug-in can provide different information
 - Depending on the options and arguments passed
- A plug-in can be concurrently run by different providers
 - Possibility of race conditions in some plug-ins
- A plug-in is executed in a periodic basis
- Configuration must take place before plug-in usage
- Dynamic management of plug-ins is desirable

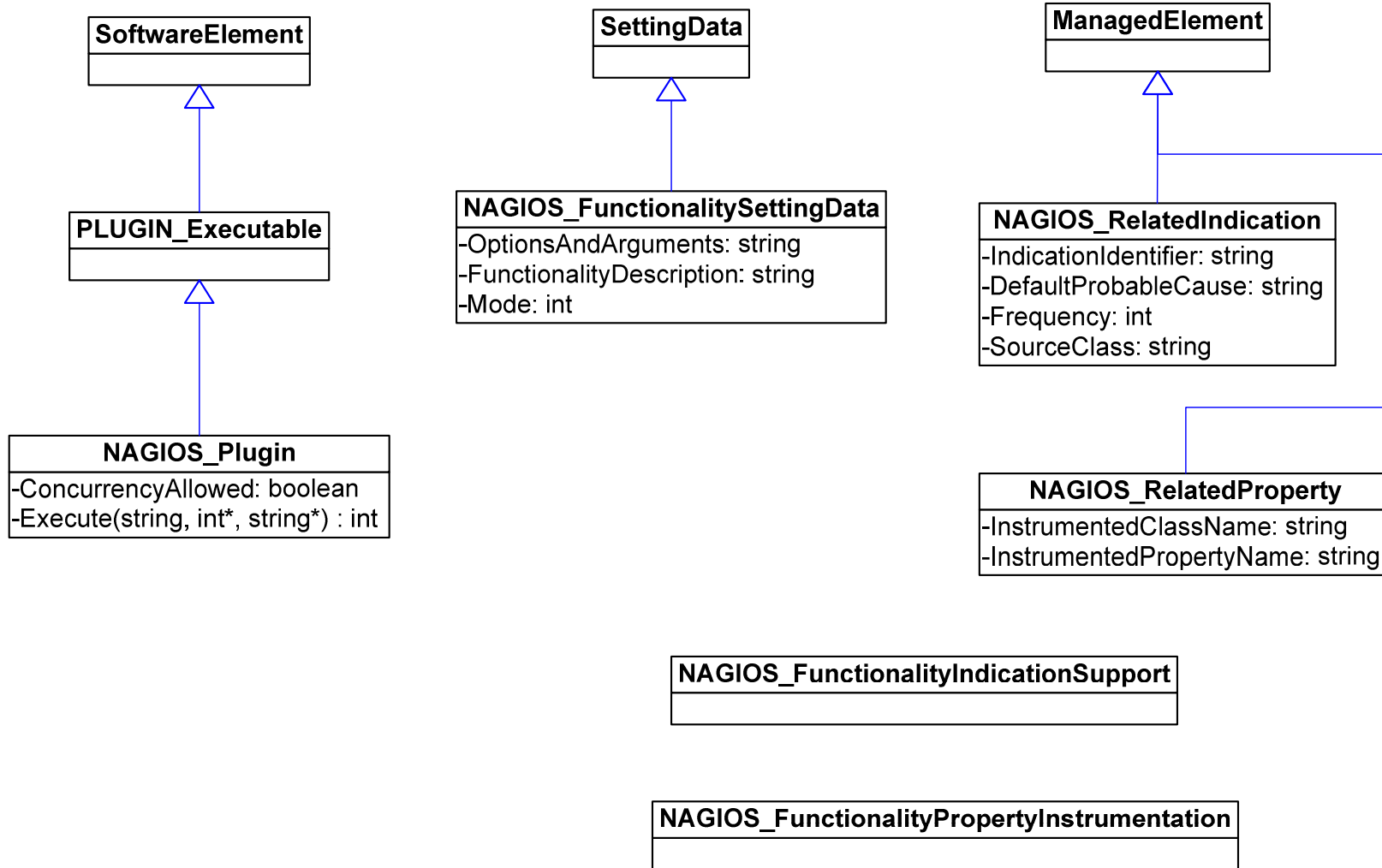
Proposed framework

- A script finds all plug-ins and asks the operator to enter the required configuration values for each plug-in
- The configuration data is stored in the CIM repository
 - Specific extension schema has been created for Nagios plug-ins
- A general Nagios plug-in indication provider has been designed to execute all Nagios plug-ins
- When a subscription is received the indication provider reads the configuration data for each plug-in and executes it
- For properties, the provider searches the appropriate plugin functionality for the class/property

Schema diagram

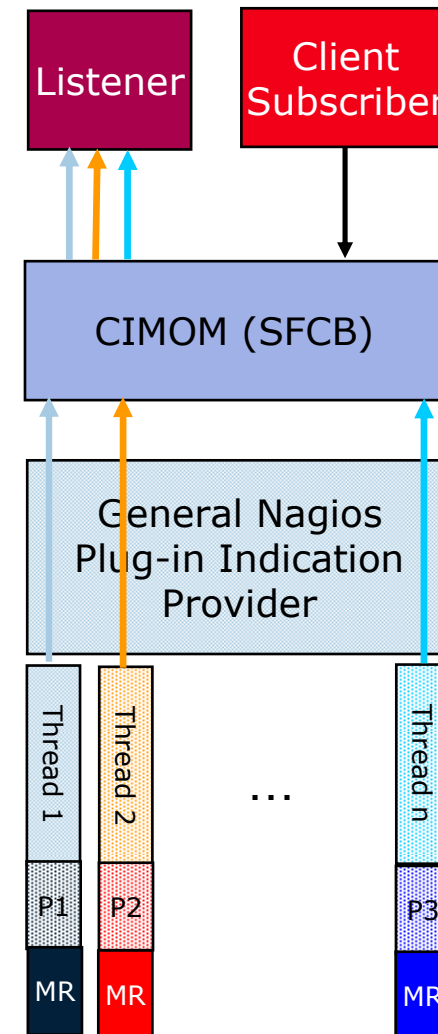


Class hierarchy



Nagios plug-in indication provider implementation

- Subscription for Alert Indications is received
- One or more plug-ins are executed depending on the filter
- Available plug-ins information is read from the repository
- For each plug-in/args one thread is created
- Each plug-in/args generates a unique indication



Demo

- There are 6 Nagios plug-ins for monitoring:
 - check_procs: process processor-time usage (Nagios distribution)
 - check_disk: disk status (Nagios distribution)
 - check_users: users in the system (Nagios distribution)
 - check_xen: Xen domains (Nagiosexchange web site)
 - check_system_pp: services up in the system (Nagiosexchange web site)
 - check_my_test: random value (developed)
- The plug-ins are configured in a configuration file
- A script reads the configuration file and creates the appropriate instances and associations in the repository
- A client console creates a CIM subscription for all AlertIndications
- The Indication Provider creates one thread per plug-in
- Each plug-in is executed in a periodic basis with the configured arguments
- For each plug-in, the associated indication is published if the execution output is Warning or Critical
- The client displays the indications received

Configuration

Subscription

Working



Demo

Conclusions

- This work enables any CIM-compliant management software to seamlessly use all existing Nagios plug-ins for indication-based monitoring and property querying
- The proposed framework provides a simple and fast procedure to configure and enable Nagios plug-ins
- It sets the basis of a CIM profile for reusing already existing monitoring plug-ins thru CIM

Future work

- To implement indications delivery for dynamic thresholds (ThresholdIndication)
- To implement the solution for property provider
- To modify or extend Nagios core engine as to use CIM as the standard for modeling and accessing managed assets
- This work could contribute to a future profile for exposing third-party monitoring plug-ins thru CIM



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Backup slides



Nagios

Core Engine

- The core engine is basically in charge of the orchestration of the monitoring
 - Triggers the measurement polling
 - Processes the measurements that are pushed by the monitored services
 - Generates alerts/notifications/reactions based on service status
- Uses the Add-ons for avoiding firewalls
 - NRPE (Nagios Remote Plug-in Executor)
 - NSCA (Nagios Service Check Acceptor)