

# Monitoring con Checkmk

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Paolo Veronesi

per il Gruppo Calcolo e Reti di INFN-BOLOGNA

# In queste slide

- Monitor ergo sum
- Presentazione Checkmk
- Configurazione distributed monitoring
  - Installazione central site via packages
  - Installazione remote site via docker
  - Integrazione central site – remote site
- Monitoring agents
  - SNMP (stampanti, ups, switch)
  - Checkmk agent (host fisici e virtuali)
  - Special agents (esempio monitoraggio VMWare e meccanismo piggyback)
  - Checkmk agent Plugins (esempio monitoraggio docker node e container, Apache)
  - Active checks (esempio check web certificate)
- Una slide su tutto il resto (Users, notifications, acknowledge, downtime, discovery, API)

# Monitoring, monitoring, monitoring

Il monitoring è **L'attività** essenziale nell'IT

- Fortunatamente oggi ci sono diverse soluzioni a disposizione, ma ancora capita di pensare al monitoraggio di una entità solo dopo che è stata messa in **produzione**, mentre dovrebbe essere monitorata dalla sua nascita, anche se solo per pochi giorni e per test
- Infrastrutture complesse e di dimensioni medio/grandi comportano una certa complessità anche del sistema di monitoring che viene adottato
- Come spesso accade, potrebbe non esistere una soluzione unica per monitorare tutte le entità, è importante quindi valutare anche aspetti quali interoperabilità e integrazione
- Senza monitoring, non è possibile avere **allarmistica**

## Storico

- Se non si hanno dati e storicizzazione, non si riesce a fare debug e correlazione con diverse grandezze ed entità di altri servizi

## Monitoring come servizio

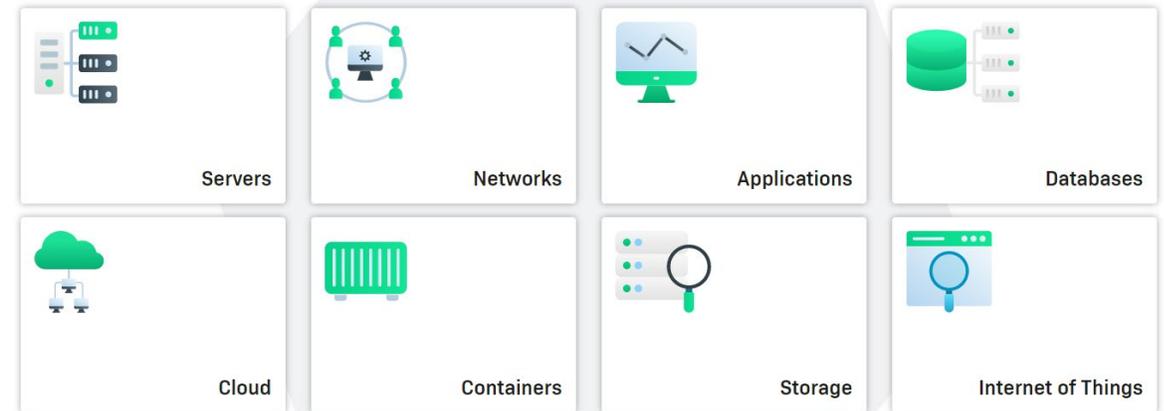
- L'obiettivo dovrebbe essere quello di avere il dispositivo/servizio monitorato non appena viene acceso/installato.

# Checkmk - <https://checkmk.com/>

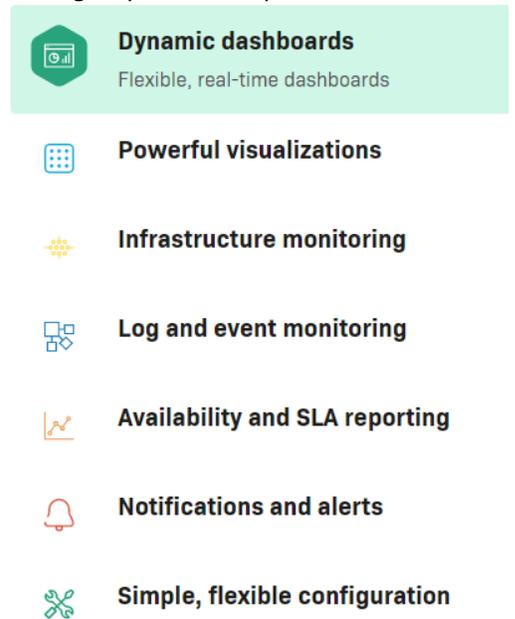
Checkmk nasce nel 2008 come agent sostitutivo inforcato da Inetd, e viene pubblicato nell'aprile 2009 sotto licenza GPL. Inizialmente basato su Nagios, è stato ampliato con una serie di nuovi componenti.

Modello di business di tipo open core. L'edizione open source del software è disponibile con diverse licenze open source, principalmente GPLv2, mentre gran parte delle edizioni commerciali sono sotto licenza "Checkmk Enterprise License".

- The **CRE Checkmk Raw Edition (CRE)** is free, 100% open source and incorporates Nagios as its core. You can use it to comprehensively monitor complex environments. Support is available in our Forum from the Checkmk community.
- The **CFE Checkmk Enterprise Free Edition (CFE)** is the right one for you if you want to test the Standard Edition, up to **25 monitored hosts**. The Free Edition contains all of the features of the Standard Edition, is free of charge and unlimited for the **first 30 days**.
- The **CSE Checkmk Enterprise Standard Edition (CEE)** is primarily aimed at professional users and offers a number of interesting features beyond the scope of the Raw Edition, such as the **Checkmk Micro Core (CMC)**
- The **CME Checkmk Enterprise Managed Services Edition (CME)** is a multi-client-capable extension of the Standard Edition via distributed monitoring

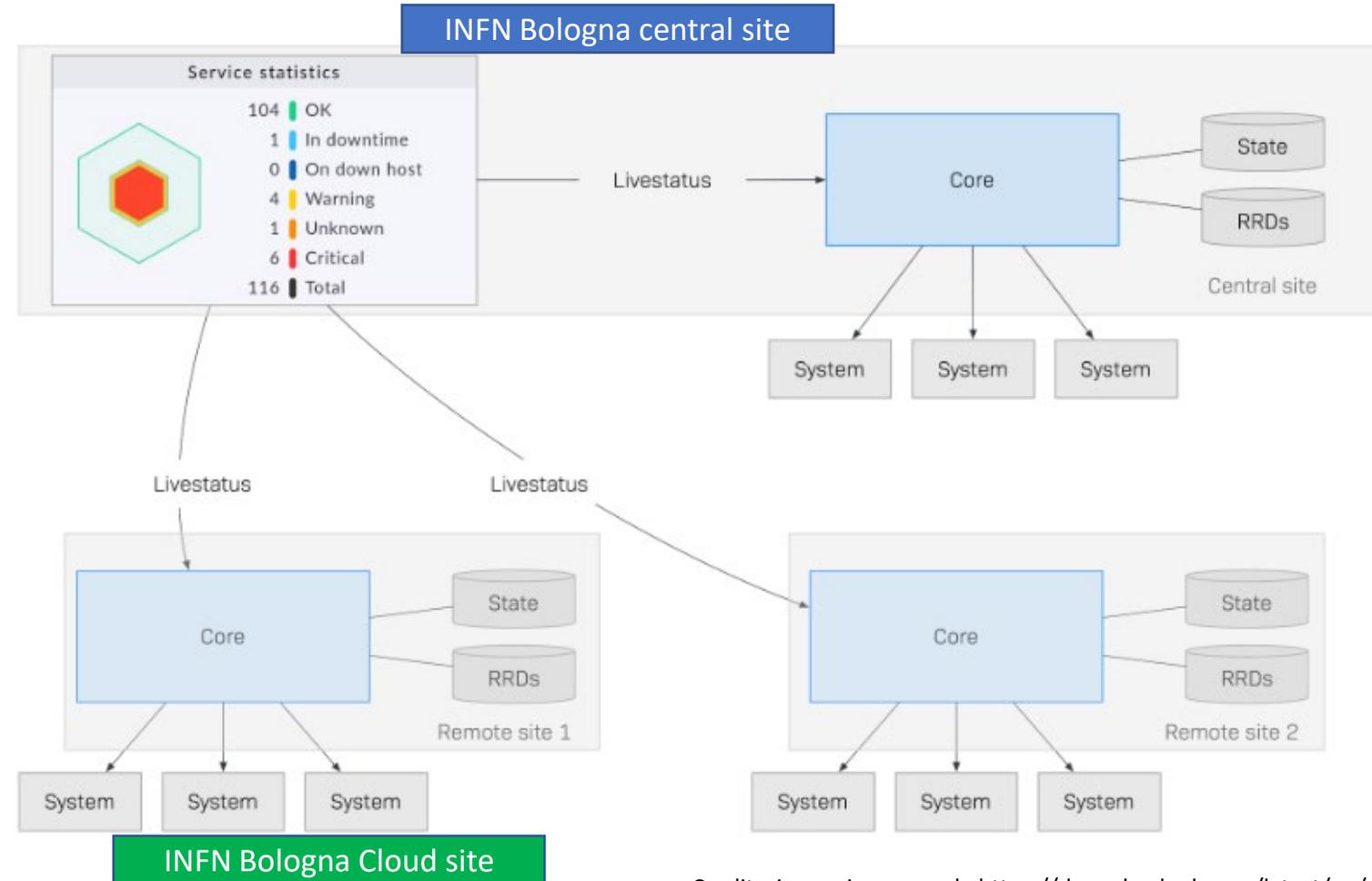


Credits: immagine prese da <https://checkmk.com>



# Checkmk – monitoring distribuito

- **Performance:** I controlli, e quindi il carico, vengono distribuiti su più server
- **Organization:** Gruppi differenti possono gestire i propri siti in maniera indipendente, ma si ha anche un punto unico in cui visualizzare lo stato.
- **Availability:** I sistemi di monitoring funzionano in maniera indipendente
- **Security:** Le porte esposte tra due datacenter (o ambienti separate) sono ridotte
- **Network:** Quando i datacenter (o gli ambienti) hanno una scarsa connettività tra di loro, il numero delle informazioni trasportate si riduce (solo i cambi di stato, ad esempio).
- **HA:** possibilità di configurazioni active/passive



Credits: immagine prese da <https://docs.checkmk.com/latest/en/>

# Installazione central site

L'installazione è banale (pacchetti disponibili per diverse distribuzioni)

⇒ [https://docs.checkmk.com/latest/en/install\\_packages.html](https://docs.checkmk.com/latest/en/install_packages.html)

```
root@nagios# omd create cclmon
Adding /opt/omd/sites/cclmon/tmp to /etc/fstab.
Creating temporary filesystem /omd/sites/cclmon/tmp...OK
Updating core configuration...
Generating configuration for core (type cmc)...Creating helper config...OK
OK
Restarting Apache...OK
Created new site cclmon with version 1.5.0p18.cre
```

The site can be started with `omd start cclmon`.  
The default web UI is available at <http://nagios.bo.infn.it/cclmon>

The admin user for the web applications is **cmkadmin** with password: **jEpCeQewW9T4**  
For command line administration of the site, log in with 'omd su cclmon'.  
After logging in, you can change the password for cmkadmin with 'htpasswd etc/htpasswd cmkadmin'.

```
OMD[cclmon]:~$ omd start
Creating temporary filesystem /omd/sites/cclmon/tmp...OK
Starting mkeventd...OK
Starting rrdcached...OK
Starting npcd...OK
Starting nagios...OK
Starting apache...OK
Starting redis...OK
Initializing Crontab...OK
```

- **Configurazione HTTPS:**

[https://docs.checkmk.com/latest/en/omd\\_https.html](https://docs.checkmk.com/latest/en/omd_https.html)

- **Autenticazione**

- SAML: <https://docs.checkmk.com/latest/en/saml.html>
- LDAP/AD: <https://docs.checkmk.com/latest/en/ldap.html>
- Kerberos: <https://docs.checkmk.com/latest/en/kerberos.html>

## Anche l'aggiornamento è banale:

- Si installa il nuovo pacchetto
- Procedura guidata per impostare la nuova versione come default (viene mantenuta anche la vecchia ed è possibile tornare indietro se serve)



Credits: immagine prese da <https://docs.checkmk.com/latest/en/>

# Installazione remote site - docker

```
docker container run -dit \  
-p 8080:5000 -e CMK_LIVESTATUS_TCP=on \  
-p 6557:6557 -e CMK_SITE_ID=cloud_t3 \  
--tmpfs /opt/omd/sites/cmik/tmp:uid=1001,gid=1001 \  
-v monitoring:/omd/sites --name monitoring \  
-v /etc/localtime:/etc/localtime:ro \  
--restart always checkmk/check-mk-raw:2.0.0p17
```

Doc:

- [https://docs.checkmk.com/latest/en/introduction\\_docker.html](https://docs.checkmk.com/latest/en/introduction_docker.html)
- <https://hub.docker.com/r/checkmk/check-mk-raw>

```
docker container logs monitoring  
### CREATING SITE 'cloud_t3'  
Adding /opt/omd/sites/cloud_t3/tmp to /etc/fstab.  
Going to set TMPFS to off.  
Updating core configuration...  
Generating configuration for core (type nagios)...Precompiling host checks...OK  
OK  
Executing post-create script "01_create-sample-config.py"...OK  
Created new site cloud_t3 with version 2.0.0p17.cre.
```

The site can be started with `omd start cloud_t3`.  
The default web UI is available at [http://7f127585a52a/cloud\\_t3/](http://7f127585a52a/cloud_t3/)

The admin user for the web applications is **cmkadmin with password: uZHckEJI**  
For command line administration of the site, log in with `'omd su cloud_t3'`.  
After logging in, you can change the password for cmkadmin with `'htpasswd etc/htpasswd cmkadmin'`.

# Integrazione central site – remote site

Documentazione [https://docs.checkmk.com/latest/en/distributed\\_monitoring.html](https://docs.checkmk.com/latest/en/distributed_monitoring.html)

### Edit site connection cloud\_t3

Setup > General > Distributed Monitoring > Edit site connection cloud\_t3

Connection Connections Display Help

Save Distributed Monitoring

#### Basic settings

Site ID: cloud\_t3  
Alias (required): Cloud@cnaf Project T3, Region Tier1

#### Status connection

Connection: Connect via TCP (IPv4)  
TCP address to connect to (required):  
Host: 131.154.161.27 Port: 6557  
Encryption: Encrypt data using TLS  
Verify server certificate:  Verify the Livestatus server certificate using the local site CA  
Use Livestatus Proxy Daemon: Connect directly (not available in CRE)  
Connect timeout: 5 Seconds  
Persistent Connection:  Use persistent connections  
URL prefix: https://131.154.161.1/cloud\_t3/  
Status host: No status host  
Disable in status GUI:  Temporarily disable this connection

#### Configuration connection

Enable replication: Push configuration to this site  
URL of remote site: https://131.154.161.1/cloud\_t3/check\_mk/  
Disable remote configuration:  Disable configuration via WATO on this site  
Ignore TLS errors:  Ignore SSL certificate errors  
Direct login to Web GUI allowed:  Users are allowed to directly login into the Web GUI of this site  
Sync with LDAP connections: Disable automatic user synchronization (use master site users)  
Replicate Event Console config:  Replicate Event Console configuration to this site  
Replicate extensions:  Replicate extensions (MKPs and files in ~/local/)

### Distributed Monitoring

Setup > General > Distributed Monitoring 3 changes

Connections Display Help Filter

+ Add connection

#### Connections

Actions	ID	Alias	Status connection	Configuration connection
 	cclmon	Local site cclmon	Connect to the local site   Online	Not enabled
 	cloud_t3	Cloud@cnaf Project T3, Region Tier1	Connect via TCP (IPv4) TCP address to connect to: 131.154.161.27, 6557 Encryption: Encrypt data using TLS, Verify server certificate: off   Online	Enabled (EC, MKPs)   Online (Version: 2.0.0p17, Edition: cre)

### Host search condor

Monitor > Hosts > Host search condor

Commands Hosts Add to Export Display Help

Acknowledge problems Schedule downtimes Filter Show checkboxes

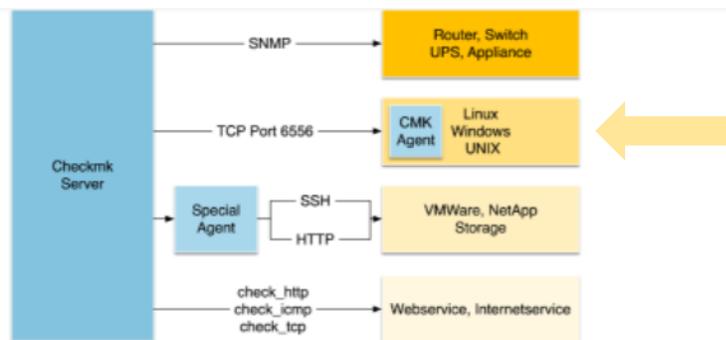
#### Local site cclmon

State	Host	Icons	OK	Wa	Un	Cr	Pd	IPv4 address	State	Host	Icons	OK	Wa	Un	Cr	Pd	IPv4 address
UP	condor.bo.infn.it		27	0	0	0	0	131.154.11.153	UP	condor2.bo.infn.it		40	0	0	0	0	131.154.102.131

#### Cloud@cnaf Project T3, Region Tier1

State	Host	Icons	OK	Wa	Un	Cr	Pd	IPv4 address	State	Host	Icons	OK	Wa	Un	Cr	Pd	IPv4 address
UP	condor-cm.novalocal		19	0	0	0	0	192.168.1.7	UP	condor-sn.novalocal		19	0	0	0	0	192.168.1.5
UP	condor-wn-2.novalocal		19	0	0	0	0	192.168.1.8									

# Monitoring Agents



Eventuali plugin vanno installati sui singoli host e l'agent li esegue quando interrogato

- Monitoring Linux
- Monitoring Windows
- Monitoring FreeBSD
- Monitoring via SNMP
- Monitoring VMWare ESXi
- Monitoring Docker
- Monitoring Kubernetes
- Integrating Prometheus
- Monitoring Amazon Web Services (AWS)
- Monitoring Microsoft Azure
- Monitoring Oracle databases
- Monitoring MySQL
- Monitoring cluster services
- Monitoring network services (Active checks)
- Monitoring time-based processes (Cronjobs)
- Monitoring files
- Datasource programs
- Local checks

Credits: immagine prese da <https://docs.checkmk.com/latest/en/>

Method	Description	Preparation
<a href="#">SNMP</a>	Checkmk accesses the target device's existing SNMP agent. With active queries (GET) it collects details on the system's condition.	<a href="#">Enable SNMP agent</a>
Checkmk agent	Checkmk has its own agents for servers and workstations. Various operating systems are supported — from the commonplace like Windows and Linux to exotics such as OpenVMS. The agents are passive and connect to TCP port 6556. Only on receiving a Checkmk server query will they be activated and respond with the required data.	Installing the Checkmk agent
<a href="#">Special agent</a>	Some systems allow neither an agent installation, nor do they support SNMP in a usable form. Instead of these they offer management APIs based on TELNET, SSH or HTTP/XML. Checkmk queries these interfaces via 'special agents' that run <b>on the Checkmk-Server</b>	Create an API account for Checkmk
<a href="#">Active checks</a>	Network-based services such as HTTP, SMTP or IMAP can by their very nature be queried via the network. For this Checkmk sometimes uses its own, sometimes existing plug-ins originally developed for Nagios. These are also called 'active checks'. For example, <code>check_http</code> is very popular for querying websites.	None

Stampanti di rete, ups, switch, ap, server fisici

Agent (ed eventuali script di plugin) sincronizzati via puppet.

Soluzione usata per monitorare il cluster VMWare

Mai più un certificato scaduto!

Credits: immagine prese da [https://docs.checkmk.com/latest/en/wato\\_monitoringagents.html](https://docs.checkmk.com/latest/en/wato_monitoringagents.html)

# SNMP – printer e ups

▼ Basic settings

Hostname ..... m0color1.bo.infn.it

Parents ..... x mc0hp2.bo.infn.it (Select hostname)

▼ Network address

IPv4 address ..... x 192.168.253.94

▼ Monitoring agents

Checkmk agent / API integrations ... No API integrations, no Checkmk agent (Inherited from Printer)

SNMP ..... SNMP v2 or v3 (Inherited from Printer)

SNMP credentials ..... \*\*\*\*\* (Inherited from Printer)

Credenziali SNMP uguali per tutte le stampanti ed ereditate

I P/N velocizzano l'intervento

State	Service	Icons	Summary
OK	CDZ Armadi Temperatura	☰ 📄	SNMP OK - Temperature 173 Celsius
OK	CDZ Finestra Temperatura	☰ 📄	SNMP OK - Temperature 0 Celsius
OK	CDZ Soffitto Temperatura	☰ 📄	SNMP OK - Temperature 191 Celsius
OK	PING	☰ 📄	OK - 192.168.253.63: rta 1.529ms, lost 0%
OK	UPS Autonomy Time	☰ 📄	SNMP OK - Battery Autonomy Minutes 72
OK	UPS Battery Charge Level	☰ 📄	UPS OK - ( UPS OK - Battery Charge at 100)
OK	UPS Internal Temperature	☰ 📄	SNMP OK - Internal Temperature Degree Celsius 43
OK	UPS On Battery	☰ 📄	UPS OK - ( UPS OK )
OK	UPS Output Load	☰ 📄	SNMP OK - Output Load 18 %
OK	UPS UpTime	☰ 📄	SNMP OK - Battery Autonomy 68 Minutes

State	Service	Icons	Summary
OK	Check_MK	☰ 📄	[snmp] Success, execution time 0.5 sec
OK	Check_MK Discovery	☰ 📄	no unmonitored services found, no vanished services found, no new host labels
CRIT	Alerts	☰ 🚨	input: Tray 3 Paper is low. Load Paper in Tray 3. Printing continues., markerSupplies: The Fuser is past the end of its life. Install P/N 115R00061 if the printer is powered by 110V or P/N 115R00062 if powered by 220V. Printing is stopped., input: Tray 2 Paper is low. Load Paper in Tray 2. Printing continues.
OK	CPU utilization	☰ 📄	Total CPU: 0%
OK	Interface 2	☰ 📄	[Xerox Phaser 7500DT Ethernet Interface, 10/100/1000 Mbps, v42.63.10.11.2013, RJ-45, Ethernet, 1000 Mbps, full duplex], (up), MAC: 00:00:AA:D5:D8:25, Speed: 1 GBit/s, In: 22.8 kB/s (0.02%), Out: 199 B/s (<0.01%)
OK	Memory used	☰ 📄	RAM: 84.13% - 431 MiB of 512 MiB
OK	Output Top Output Tray	☰ 📄	Output Tray, Status: Available and idle, Alerts: None, Maximal capacity: 250 sheets, At least one filled
OK	Pages	☰ 📄	total prints: 169446
OK	PING	☰ 📄	OK - 192.168.253.94: rta 0.123ms, lost 0%
OK	SNMP Info	☰ 📄	Xerox Phaser 7500DT: System 1.3.8.P, OS 9.49, PS 5.22.1, Eng 40.12.1, Net 42.63.10.11.2013, Adobe PostScript 3016.101 (15), PCL 5c Version 5.0, m0color1 - Phaser 7500DT, CCL Viale B. Pichat, logtoccl@bo.infn.it
OK	Supply Accumulator Belt Phaser 7500 P/N 604K15321	☰ 📄	Remaining: 68%, Supply: 68 of max. 100%
OK	Supply Black High Capacity Toner Cartridge Phaser 7500 P/N 106R01439	☰ 📄	Remaining: 48%, Supply: 1402 of max. 2920 tenths of grams
OK	Supply Black Imaging Unit Phaser 7500 P/N 108R00861	☰ 📄	
OK	Supply Cyan High Capacity Toner Cartridge Phaser 7500 P/N 106R01436	☰ 📄	
OK	Supply Cyan Imaging Unit Phaser 7500 P/N 108R00861	☰ 📄	
CRIT	Supply Fuser/Belt Cleaner Assembly Phaser 7500P/N 115R00061110V/ P/N 115R00062220V	☰ 🚨	

Remaining supply 2022-05-05 @ 2m

f grams

max. 100%

# SNMP - switch

▼ Basic settings

Hostname ..... mc0hp1.bo.infn.it  
Alias ..... empty (Default value)  
Monitored on site ..... cclmon - Local site cclmon (Default value)  
Permissions ..... empty (Default value)  
Parents ..... gw-area-3.bo.infn.it (Select hostname)

▼ Network address

IP address family ..... IPv4 only (Default value)  
IPv4 address ..... 192.168.253.131  
Additional IPv4 addresses ..... No entries (Default value)  
Additional IPv6 addresses ..... No entries (Default value)

▼ Monitoring agents

Checkmk agent / API integrations ..... No API integrations, no Checkmk agent (Inherited from Network)  
SNMP ..... SNMP v2 or v3 (Inherited from Network)  
SNMP credentials ..... \*\*\*\*\* (Inherited from Network)  
Piggyback ..... Use piggyback data from other hosts if present (Default value)

▼ Custom attributes

Credenziali SNMP uguali per tutti gli switch ed ereditate

+ Monitored services			
	State	Service	Status detail
  	OK	Interface 05	[AP B045], (up), MAC: 78:48:59:38:E5:36, Speed: 1 GBit/s
  	OK	Interface 29	[mwl-1officina], (up), MAC: 78:48:59:38:E5:4E, Speed: 100 MBit/s
  	OK	Interface 36	[upscavediom], (up), MAC: 78:48:59:38:E5:55, Speed: 100 MBit/s
  	OK	Interface 52	[From ex4550 porta 7], (up), MAC: 78:48:59:38:E5:65, Speed: 1 GBit/s
  	OK	SNMP Info	HP Comware Platform Software, Software Version 5.20.99 Release 2221P18-US HP A5120-48G Development Company, L.P., mc0hp1, Morassutti Cavedio Piano 0, CCL ccl@bo.infn.it
  	OK	Uptime	Up since Apr 07 2022 07:03:27, Uptime: 28 days 7 hours

x Disabled services			
	State	Service	Status detail
  	OK	Interface 03	[GigabitEthernet1/0/3 Interface], (up), MAC: 78:48:59:38:E5:34, Speed: 1 GBit/s
  	OK	Interface 07	[GigabitEthernet1/0/7 Interface], (up), MAC: 78:48:59:38:E5:38, Speed: 1 GBit/s
  	OK	Interface 12	[GigabitEthernet1/0/12 Interface], (up), MAC: 78:48:59:38:E5:3D, Speed: 1 GBit/s
  	OK	Interface 13	[GigabitEthernet1/0/13 Interface], (up), MAC: 78:48:59:38:E5:3E, Speed: 100 MBit/s
  	CRIT	Interface 15	[GigabitEthernet1/0/15 Interface], (down) CRIT, MAC: 78:48:59:38:E5:40, Speed: 1 GBit/s
  	OK	Interface 16	[GigabitEthernet1/0/16 Interface], (up), MAC: 78:48:59:38:E5:41, Speed: 1 GBit/s
  	OK	Interface 20	[GigabitEthernet1/0/20 Interface], (up), MAC: 78:48:59:38:E5:45, Speed: 1 GBit/s
  	OK	Interface 21	[GigabitEthernet1/0/21 Interface], (up), MAC: 78:48:59:38:E5:46, Speed: 100 MBit/s

Il monitoring di alcune interfacce è disabilitato

# Agent + SNMP – server fisico

Hostname ..... storage-t3-01.cr.cnaf.infn.it  
Alias ..... empty (Default value)  
Monitored on site ..... cclmon - Local site cclmon (Default value)  
Permissions ..... All but network, contact\_group\_t3\* (Inherited from T3)  
Parents ..... empty (Default value)

▼ Network address

IP address family ..... IPv4 only (Default value)  
IPv4 address ..... empty (Default value)  
Additional IPv4 addresses ..... No entries (Default value)  
Additional IPv6 addresses ..... No entries (Default value)

▼ Monitoring agents

Checkmk agent / API integrations ..... X API integrations if configured, else Checkmk agent ▼  
SNMP ..... X SNMP v2 or v3 ▼  
SNMP credentials ..... X SNMP community (SNMP Versions 1 and 2c) ▼  
Piggyback ..... Use piggyback data from other hosts if present (Default value)

check\_mk agent + snmp

OK Disk IO sdb1 [11]. Read: 0.00 B/s, Write: 0.00 B/s, Read operations: 0.00 1/s, Write operations: 0.00 1/s 2021-09-14 13:11:25 2022-05-05 14:03:22 0.00 B/s 0.00 B/s

OK Disk IO sdc [1]. Read: 0.00 B/s, Write: 0.00 B/s, Read operations: 0.00 1/s, Write operations: 0.00 1/s 2021-09-14 13:11:25 2022-05-05 14:03:22 0.00 B/s 0.00 B/s

OK Disk IO sdc1 [2]. Read: 0.00 B/s, Write: 0.00 B/s, Read operations: 0.00 1/s, Write operations: 0.00 1/s 2021-09-14 13:11:25 2022-05-05 14:03:22 0.00 B/s 0.00 B/s

OK Disk IO sdd [3]. Read: 0.00 B/s, Write: 0.00 B/s, Read operations: 0.00 1/s, Write operations: 0.00 1/s 2021-09-14 13:11:25 2022-05-05 14:03:22 0.00 B/s 0.00 B/s

OK Disk IO sdd1 [4]. Read: 0.00 B/s, Write: 0.00 B/s, Read operations: 0.00 1/s, Write operations: 0.00 1/s 2021-09-14 13:11:25 2022-05-05 14:03:22 0.00 B/s 0.00 B/s

OK Disk IO sdd2 [5]. Read: 0.00 B/s, Write: 0.00 B/s, Read operations: 0.00 1/s, Write operations: 0.00 1/s 2021-09-14 13:11:25 2022-05-05 14:03:22 0.00 B/s 0.00 B/s

OK Disk IO sde [6]. Read: 0.00 B/s, Write: 0.00 B/s, Read operations: 0.00 1/s, Write operations: 0.00 1/s 2021-09-14 13:11:25 2022-05-05 14:03:22 0.00 B/s 0.00 B/s

OK Disk IO sde1 [7]. Read: 0.00 B/s, Write: 0.00 B/s, Read operations: 0.00 1/s, Write operations: 0.00 1/s 2021-09-14 13:11:25 2022-05-05 14:03:22 0.00 B/s 0.00 B/s

OK Disk IO SUMMARY Read: 4.37 kB/s, Write: 1.77 kB/s, Latency: 3 milliseconds 2020-06-04 09:32:16 2022-05-05 14:03:22 4.26 kB/s 1.73 kB/s

OK Memory Total virtual memory: 2.96% - 1.37 GB of 46.46 GB 2020-06-04 09:32:16 2022-05-05 14:03:22 4.45%

OK Mount options of / Mount options exactly as expected 2020-06-04 09:32:16 2022-05-05 14:03:22

OK Mount options of /boot Mount options exactly as expected 2020-06-04 09:32:16 2022-05-05 14:03:22

OK NTP Time Offset: 0.1190 ms, Time since last sync: 3 minutes 42 seconds 2021-05-13 11:00:34 2022-05-05 14:03:22 119 µs

OK Number of threads Count: 205 threads, Usage: 0.08% 2020-06-04 09:32:16 2022-05-05 14:03:22 205

OK PING OK - 131.154.140.7: rta 0.880ms, lost 0% 2022-04-07 11:54:31 2022-05-05 14:04:43 880 µs

OK Postfix Queue Deferred queue length: 0, Active queue length: 0 2020-06-04 09:32:16 2022-05-05 14:03:22 0 / 0

OK SNMP Info Linux storage-t3-01.cr.cnaf.infn.it 3.10.0-1160.25.1.el7\_x86\_64 #1 SMP Wed Apr 28 21:49:45 UTC 2021 x86\_64, storage-t3-01.cr.cnaf.infn.it, "INFN Sezione Bologna", ccl@bo.infn.it 2021-09-14 12:41:25 2022-05-05 14:03:22

OK SSH SSH OK - OpenSSH\_7.4 (protocol 2.0) 2022-04-22 21:21:51 2022-05-05 13:56:51

OK System Service Summary Total: 122, Disabled: 10, Failed: 0 2020-07-09 14:57:07 2022-05-05 14:03:22

OK TCP Connections Established: 6 2020-06-04 09:32:16 2022-05-05 14:03:22

OK Uptime Up since May 13 2021 10:34:07, Uptime: 357 days 3 hours 2020-06-04 09:32:16 2022-05-05 14:03:22 357 d

OK YUM Updates 5 updates available, Last Update was run at 2022-03-28 16:07:00 2022-02-02 17:19:13 2022-05-05 14:03:22

- Storicizzazione dei dati e visualizzazione
- Monitor degli update yum (critico se security, warning se necessario reboot)

# Monitoring VMWare via vCenter

The screenshot displays the Checkmk monitoring interface for VMware ESX via vSphere. The left sidebar contains configuration options for the vSphere connection, including user name, secret, query type, and various checkboxes for monitoring details. The main area shows a list of monitored items with their status and details.

**Configuration (Left Sidebar):**

- vSphere User name (required): administrator@vsphere.mul
- vSphere secret: Explicit
- Type of query: Queried host is the vCenter
- TCP Port number: (empty)
- SSL certificate checking: Deactivated
- Connect Timeout: (empty)
- Retrieve information about... (required):
  - Host Systems
  - Virtual Machines
  - Datastores
  - Performance Counters
  - License Usage
- Placeholder VMs:
  - Do no monitor placeholder VMs
- Display ESX Host power state on: The queried ESX system (vCenter / Host)
- Display VM power state additionally on: The queried ESX system (vCenter / Host)
- VM snapshot summary:
  - Display snapshot summary on ESX hosts
- Piggyback name of virtual machines: Use the VMs hostname if set, otherwise fall back to ESX name
- Spaces in hostnames: Cut everything after first space

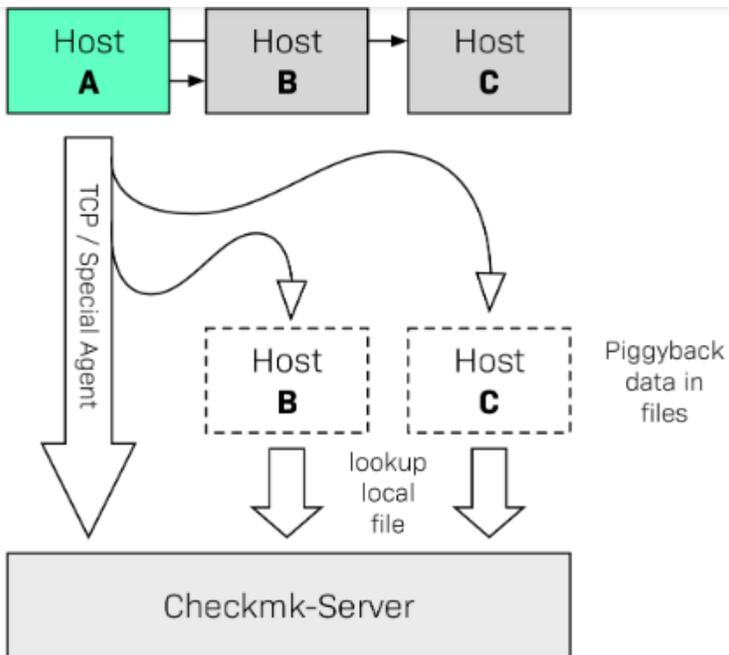
**Monitored Items (Main Area):**

Status	Item Name	Details
CRIT	Filesystem IscsiVmStoreEternus01	96.35% used (986.42 of 1023.75 GB, warn/crit at 80.00%/90.00%), trend: +1.61 GB / 24 hours CRIT Uncommitted: 312.36 GB, Provisioning: 126%
OK	Filesystem IscsiVmStoreEternus02	47.33% used (3.31 of 7.00 TB), trend: +547.80 MB / 24 hours, Uncommitted: 2.22 TB, Provisioning: 79.03%
OK	Filesystem LocalBlade3Datastore	0.52% used (1.41 of 271.00 GB), trend: 0.00 B / 24 hours
OK	Filesystem LocalBlade4Datastore	0.52% used (1.41 of 271.00 GB), trend: 0.00 B / 24 hours
OK	Filesystem LocalDom1Datastore	0.26% used (1.41 of 550.75 GB), trend: 0.00 B / 24 hours
OK	Filesystem LocalDom4Datastore	0.26% used (1.41 of 550.75 GB), trend: 0.00 B / 24 hours
OK	Filesystem Localmulti1Datastore	0.52% used (1.41 of 271.25 GB), trend: 0.00 B / 24 hours
OK	Filesystem LocalMulti2Datastore	0.52% used (1.41 of 271.25 GB), trend: 0.00 B / 24 hours
OK	Filesystem LocalMulti3Datastore	0.52% used (1.41 of 271.25 GB), trend: 0.00 B / 24 hours
OK	Filesystem NFSCclst1Datastore	62.36% used (14.66 of 23.51 TB), trend: -29.08 GB / 24 hours, Uncommitted: 0.00 B, Provisioning: 62.36%
OK	Filesystem vmwareClusterHA	6.29% used (1.87 of 29.75 GB), trend: 0.00 B / 24 hours, Uncommitted: 0.00 B, Provisioning: 6.29%
OK	HostSystem blade3.bo.infn.it	power state: poweredOn
OK	HostSystem blade4.bo.infn.it	power state: poweredOn
OK	HostSystem dom1.bo.infn.it	power state: poweredOn
OK	HostSystem dom4.bo.infn.it	power state: poweredOn
OK	HostSystem multi1.bo.infn.it	power state: poweredOn
OK	HostSystem multi2.bo.infn.it	power state: poweredOn
OK	HostSystem multi3.bo.infn.it	power state: poweredOn
OK	License VMware vCenter Server 6 Standard	1 Key(s), used 1 out of 1 licenses
OK	License VMware vSphere with Operations Management 6 Enterprise Plus	4 Key(s), used 11 out of 40 licenses
OK	Object count	Virtualmachines: 62, Hostsystems: 7
OK	PING	OK - 131.154.11.181: rta 0.156ms, lost 0%
OK	SSH	SSH OK - OpenSSH_7.4 (protocol 2.0)
OK	System Time	Offset: -3.67 ms
OK	VM apachebo.bo.infn.it	power state: poweredOn, running on [dom4.bo.infn.it]
OK	VM boposta.bo.infn.it	power state: poweredOn, running on [dom4.bo.infn.it]
OK	VM boradius	power state: poweredOn, running on [blade4.bo.infn.it]
OK	VM cclrepo.bo.infn.it	power state: poweredOn, running on [multi2.bo.infn.it]

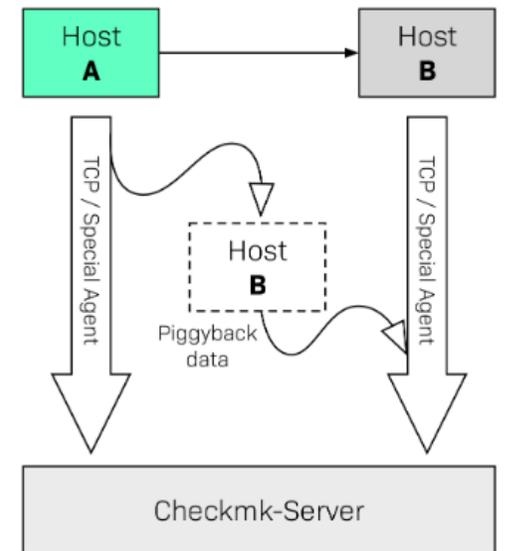
# Monitor vm di vmware - Piggyback

Here is a situation in which data needs to be queried from a particular host because the data is located only on that host (for example, from an ESX host system or the vCenter), but in the monitoring the data relates to a completely different host (a virtual machine for example).

Host B e C sono registrati in checkmk, ma non sono monitorati in maniera attiva



- Host B è registrato in checkmk e monitorato in maniera attiva (checkmk agent).
- Le informazioni recuperate via agent sono fuse con quelle recuperate interrogando l'host A



# Monitor di vm con agent + piggyback

Datasource: agent e vCenter (vcsa)

Piggyback dal vCenter

apachebo.bo.infn.it			
State	Service	Icons	Summary
OK	Check_MK	☰ 📁	[agent] Version: 2.0.0p17, OS: linux, [piggyback] Valid sources: vcsa.bo.infn.it, execution time 1.0 sec
OK	Check_MK Discovery	☰	no unmonitored services found, no vanished services found, no new host labels
OK	CPU load	☰ 📁	15 min load: 0.00
OK	CPU utilization	☰ 📁	Total CPU: 0.93%
OK	Disk IO SUMMARY	☰ 📁	Read: 0.00 B/s, Write: 3.57 kB/s, Latency: 847 microseconds
OK	ESX CPU	☰ 📁	demand is 0.021 Ghz, 1 virtual CPUs
OK	ESX Datastores	☰	Stored on NFSDatastore (23.51 TB/37.6% free), Stored on IscsiVmStoreEternus02 (7.00 TB/52.7% free)
OK	ESX Guest Tools	☰	VMware Tools are installed, but are not managed by VMWare
OK	ESX Heartbeat	☰	Heartbeat status is green
OK	ESX Hostsystem	☰	Running on dom4.bo.infn.it
OK	ESX Memory	☰ 📁	Host: 3.80 GB, Guest: 81.00 MB, Ballooned: 0.00 B, Private: 3.77 GB, Shared: 65.00 MB
OK	ESX Mounted Devices	☰	HA functionality guaranteed
OK	ESX Name	☰	apachebo
OK	ESX Snapshots	☰	Count: 4, Powered on: VM Snapshot 10%252f11%252f2021, 09:54:44, VM Snapshot 13%252f12%252f2021, 08:20:55, VM Snapshot 1%252f3%252f2022, 10:42:17, Latest: VM Snapshot 1%252f3%252f2022, 10:42:17, Mar 01 2022 09:42:37, Oldest: VM Snapshot 28%252f8%252f2021, 08:41:55, Sep 28 2021 06:42:20
OK	Filesystem /	☰ 📁	9.38% used (4.16 of 44.41 GB), trend: +1.43 MB / 24 hours
OK	Filesystem /boot	☰ 📁	26.78% used (261.34 of 975.90 MB), trend: +616.71 B / 24 hours
OK	Filesystem /boot/efi	☰ 📁	0.96% used (5.78 of 598.81 MB), trend: -0.00 B / 24 hours
OK	Interface 2	☰ 📁	[ens192], (up), MAC: 00:50:56:AF:34:2F, Speed: 10 GBit/s, In: 10.8 kB/s (<0.01%), Out: 96.4 B/s (<0.01%)
OK	Kernel Performance	☰ 📁	Process Creations: 0.49/s, Context Switches: 761.42/s, Major Page Faults: 0.00/s, Page Swap in: 0.00/s, Page Swap Out: 0.00/s
OK	Memory	☰ 📁	Total virtual memory: 3.41% - 264.36 MB of 7.56 GB
OK	Mount options of /	☰	Mount options exactly as expected
OK	Mount options of /boot	☰	Mount options exactly as expected
OK	Mount options of /boot/efi	☰	Mount options exactly as expected
OK	NTP Time	☰ 📁	Offset: 0.0551 ms, Stratum: 3, Time since last sync: 43 seconds
OK	Number of threads	☰ 📁	Count: 229 threads, Usage: 0.79%
OK	PING	☰ 📁	OK - 131.154.102.134: rta 0.301ms, lost 0%
OK	Postfix Queue	☰ 📁	Deferred queue length: 0, Active queue length: 0
OK	Postfix status	☰	Status: the Postfix mail system is running, PID: 1469
OK	SSH	☰ 📁	SSH OK - OpenSSH_8.0 (protocol 2.0)

# Docker monitor - node...

- [https://docs.checkmk.com/latest/en/monitoring\\_docker.html](https://docs.checkmk.com/latest/en/monitoring_docker.html)
- Si aggiunge lo script (ufficiale) `mk_docker.py` nella directory plugins: `/usr/lib/check_mk_agent/plugins` in modo tale che lo script venga eseguito dall'agent
- A questo punto vengono monitorate alcune proprietà di docker

**Docker nodes**  
Monitor > Applications > Docker nodes

Commands Hosts Add to Export Display Help ↕

⚠ Acknowledge problems 📅 Schedule downtimes 🗑 Filter 🗒 Show checkboxes

**Local site cclmon**

State	Host	Icons	OK	Wa	Un	Cr	Pd
UP	Inxpv01.bo.infn.it	☰ 🟡	38	0	0	0	0
UP	pcdeeplearning1.bo.infn.it	☰ 🟡	29	0	0	0	0

**Cloud@cnaf Project T3, Region Tier1**

State	Host	Icons	OK	Wa	Un	Cr	Pd
UP	server-nfs.novalocal	☰ 🟡	28	0	0	0	0

**Inxpv01.bo.infn.it**

State	Service	Icons	Summary
OK	Check_MK	☰ 🟡	[agent] Version: 2.0.0p17, OS: linux, [piggyback] Valid sources: vcsa.bo.infn.it, execution time 1.8 sec
OK	Check_MK Discovery	☰ 🟡	no unmonitored services found, no vanished services found, no new host labels
OK	Check_MK HW/SW Inventory	☰ 🟡	Found 75 inventory entries, Found 7 status entries
OK	CPU load	☰ 🟡	15 min load: 0.05 at 2 cores (0.03 per core)
OK	CPU utilization	☰ 🟡	Total CPU: 1.57%
OK	Disk IO SUMMARY	☰ 🟡	Read: 0.00 B/s, Write: 3.45 kB/s, Latency: 731 microseconds
OK	Docker containers	☰ 🟡	Containers: 1, Running: 1, Paused: 0, Stopped: 0
OK	Docker disk usage - buildcache	☰ 🟡	Size: 0.00 B, Reclaimable: 0.00 B, Count: 0, Active: 0
OK	Docker disk usage - containers	☰ 🟡	Size: 12.05 MB, Reclaimable: 0.00 B, Count: 1, Active: 1
OK	Docker disk usage - images	☰ 🟡	Size: 393.10 MB, Reclaimable: 0.00 B, Count: 1, Active: 1
OK	Docker disk usage - volumes	☰ 🟡	Size: 192.00 kB, Reclaimable: 0.00 B, Count: 1, Active: 1
OK	Docker node info	☰ 🟡	Daemon running on host Inxpv01.bo.infn.it
OK	ESX CPU	☰ 🟡	demand is 0.022 Ghz, 2 virtual CPUs

# ... e container

- Con il meccanismo del piggyback, se si aggiunge esplicitamente un container, a questo vengono aggiunti i servizi recuperati dal docker node
- E' possibile rendere friendly il container con un mapping tra **container\_short\_id** e **container\_name**
  - A volte non è possibile installare l'agent checkmk nel container: essendo i container minimali, non è detto che l'agent produca un output utile
  - E' raccomandabile monitorare anche il servizio esposto dal container

Inventory of host **Inxpv01.bo.infn.it**

Monitor > Overview > All hosts > Inxpv01.bo.infn.it > Services of Host > Inventory of host Inxpv01.bo.infn.it

Commands Host Add to Export Display Help

Acknowledge problems Schedule downtimes Filter Show checkboxes Services of Host

Hostname Inxpv01.bo.infn.it

Software Applications Checkmk

Checkmk Agent Version 2.0.0p17

Cluster Cluster host No

Docker

Version	20.10.15
Registry	https://index.docker.io/v1/
Swarm State	inactive
Swarm Node Id	

Containers

ID	Creation	Name	Labels	Status	Image
<b>59eb4d933419</b>	2022-05-06T09:46:59.235019758Z	/yatch	build_version: Linuxserver.io version:- f01ef357-Is40 Build-date:- 2022-04-12T08:30:18+02:00 mainfainer: TheLamer org.opencontainers.image.authors: linuxserver.io org.opencontainers.image.created: 2022-04-12T08:30:18+02:00 org.opencontainers.image.description: baseimage-alpine image by linuxserver.io org.opencontainers.image.documentation: https://docs.linuxserver.io/images/docker-baseimage-alpine org.opencontainers.image.licenses: GPL-3.0-only org.opencontainers.image.ref.name: b2601a86d55822219f8e774e3907b5453032cca6 org.opencontainers.image.revision: b2601a86d55822219f8e774e3907b5453032cca6 org.opencontainers.image.source: https://github.com/linuxserver/docker-baseimage-alpine org.opencontainers.image.title: Baseimage-alpine org.opencontainers.image.uri: https://github.com/linuxserver/docker-baseimage-alpine/packages org.opencontainers.image.vendor: linuxserver.io org.opencontainers.image.version: f01ef357-Is40	running	ed87d6d70188

Services of Host 59eb4d933419

Monitor > Overview > All hosts > 59eb4d933419 > Services of Host

Commands Host Services Add to Export Display Help

Acknowledge problems Schedule downtimes Filter Show checkboxes 59eb4d933419

State	Service	Icons	Summary
OK	Check_MK	☰ 📁	[piggyback] Valid sources: <b>Inxpv01.bo.infn.it</b> execution time 0.0 sec
OK	Check_MK Discovery	☰	no unmonitored services found, no vanished services found, no new host labels
OK	CPU utilization	☰	Total CPU: 0.08%
OK	Disk IO SUMMARY	☰	Read: 0.00 B/s, Write: 0.00 B/s, Read operations: 0.00 1/s, Write operations: 0.00 1/s
OK	Docker container status	☰	Container running on node Inxpv01.bo.infn.it
OK	Memory used	☰ 📁	RAM: 1.40% - 53.1 MiB of 3.70 GiB
OK	Uptime	☰ 📁	Up since May 06 2022 12:28:31, Uptime: 4 days 0 hours

# Qualche altro esempio – Check Apache

Categoria plugin (ufficiali): si aggiungono script in `/usr/lib/check_mk_agent/plugins/` che vengono eseguiti quando è interrogato l'agent checkmk



Altri esempi della stessa categoria:

- Mysql, PostgreSQL, Oracle, NGINX, mongodb, ceph, docker, sap
- Logwatch: si specificano i file e le stringhe per le quali segnalare un CRITICAL e/o un WARNING
- Possibilità di cache: si mette lo script in `/usr/lib/check_mk_agent/plugins/360/` e il check viene eseguito ogni 360 minuti

# Qualche altro esempio - Check https

In questa categoria rientrano tutti i casi in cui si possono fare check dal server checkmk verso una porta che espone il servizio che si vuole monitorare

▼ Check HTTP service

Service name (required)  
check\_cert\_https

Host settings

- Hosts name / IP address
- TCP Port
- IP address family
- Virtual host

Use proxy

Mode of the Check  
Check SSL Certificate Age ▼

Age

- Warning at or below 30 days
- Critical at or below 10 days

Doppio beneficio:

- Verifico che la porta 443 sia aperta
  - Apache può essere up, ma il firewall chiuso
- Già che ci sono, verifico la scadenza del certificato
  - Warning a 30 giorni
  - Critical a 10 giorni

OK

HTTPS  
check\_cert\_https



OK - Certificate 'nagios.bo.infn.it' will expire on Thu Jun 23 00:00:00 2022 +0000.

# Users, notifications, acknowledge, downtime, discovery, API

Qualche altra caratteristica che rende checkmk adatto anche per gli utenti generici

- Possibilità di raggruppare utenti e host/servizi
- Assegnare (gruppi di) host/servizi a (gruppi di) utenti
- In questo modo gli utenti:
  - Vedono via web solo gli host assegnati
  - Ricevono solo le notifiche che decidono di ricevere riguardo agli host loro assegnati
  - Possono gestire gli host (e/o i servizi) loro assegnati
    - acknowledge di problemi
    - Commenti
    - Downtime
- Possibilità di abilitare notifiche diverse dalle mail e policy per ogni tipo di notifica (singola, ripetuta ogni tot, escalation).
- Mettendo in relazione host/servizi, possibilità di diminuire il numero di notifiche (se va giù uno sw, ricevo la notifica **sw down** e non tutte le notifiche degli host (down) collegati).
- Possibilità di discovery periodico di host (per non dimenticarsi di monitorare niente)
- API:
  - Command line: [https://docs.checkmk.com/latest/en/cmkn\\_commandline.html](https://docs.checkmk.com/latest/en/cmkn_commandline.html)
  - REST-API: [https://docs.checkmk.com/latest/en/rest\\_api.html](https://docs.checkmk.com/latest/en/rest_api.html)
  - HTTP-API: [https://docs.checkmk.com/latest/en/web\\_api.html](https://docs.checkmk.com/latest/en/web_api.html)

Integrating ntopng in Checkmk  
Integrating Checkmk in Grafana  
NagVis: status data on maps and diagrams  
Connecting Nagstamon to Checkmk  
Notifications via Jira  
Notifications via Mattermost  
Notifications via PagerDuty  
Notifications via Pushover  
Notifications via Opsgenie  
Notifications via ServiceNow  
Notifications via Slack  
Notifications via VictorOps  
Notifications via Cisco Webex Teams

# Conclusioni

- E' stato presentato l'ennesimo tool di monitoring: checkmk
  - Non ci sono scuse per non monitorare (e allarmare) anche gli host di test
    - Costruite un pilota? Monitoratelo
- Checkmk è molto di più di un nagios + plugins
- E' molto semplice da installare/aggiornare
  - In poco tempo ci si orienta anche nella UI che è offre tanti servizi e views (anche customizzabili)
  - Con il discovery e un sistema di configuration management, si automatizza tutto e non si hanno più host sconosciuti (non monitorati) in rete
- Il tool è in uso ad esempio a Lepida SPA, che fornisce servizi a Pubbliche Amministrazioni, Ospedali, Farmacie, medici di base in Emilia Romagna
  - Lepida ha quattro datacenter (Bologna, Ravenna, Ferrara, Modena) e usa una configurazione distribuita con un master e quattro core distribuite
    - 'Best Paper' alla IEEE CCWC 2022 - [shorturl.at/qCJNP](https://shorturl.at/qCJNP)