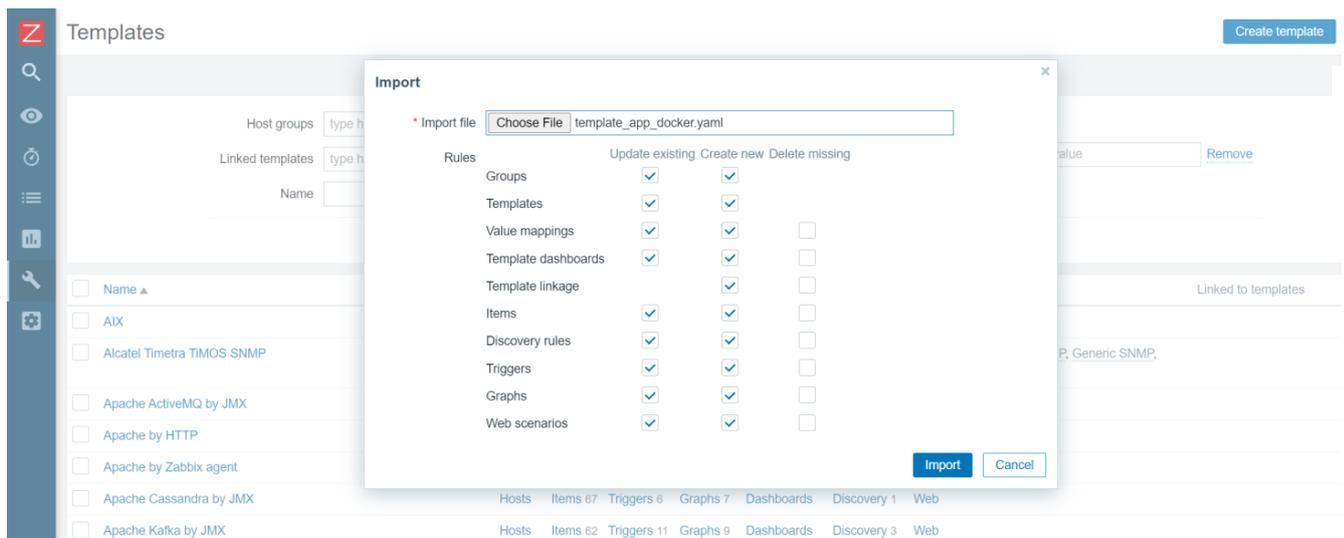


Docker Container Monitoring With Zabbix

Credit **Dmitry Lambert** Original URL: <https://blog.zabbix.com/docker-container-monitoring-with-zabbix/20175/>

Importing the official Docker template



Importing the Docker by Zabbix agent 2 template

Since we will be using the official *Docker by Zabbix agent 2* template, first, we need to make sure that the template is actually available in our Zabbix instance. The template is available for **Zabbix versions 5.0, 5.4, and 6.0**. If you cannot find this template under *Configuration - Templates*, chances are that you haven't imported it into your environment after upgrading Zabbix to one of the aforementioned versions. Remember that Zabbix does not modify or import any templates during the upgrade process, so we will have to import the template manually. If that is so, simply [download the template](#) and import it into your Zabbix instance by using the Import button in the *Configuration - Templates* section.

Installing and configuring Zabbix agent 2

Before we get started with configuring our host, we first have to install Zabbix agent 2 and configure it according to the template guidelines. Follow the steps in [the download section of the Zabbix website](#) and install the zabbix-agent2 package. Feel free to use any other agent deployment methods if you want to (like compiling the agent from the source files)

Installing Zabbix agent2 from packages takes just a few simple steps:

Install the Zabbix repository package:

```
rpm -Uvh https://repo.zabbix.com/zabbix/6.0/rhel/8/x86_64/zabbix-release-6.0-1.el8.noarch.rpm
```

Install the Zabbix agent 2 package:

```
dnf install zabbix-agent2
```

Configure the *Server* parameter by populating it with your Zabbix server/proxy address

```
vi /etc/zabbix/zabbix_agent2.conf
```

```
### Option: Server
# List of comma delimited IP addresses, optionally in CIDR notation, or DNS names of Zabbix
servers and Zabbix proxies.
# Incoming connections will be accepted only from the hosts listed here.
# If IPv6 support is enabled then '127.0.0.1', '::127.0.0.1', '::ffff:127.0.0.1' are treated
equally
# and '::/0' will allow any IPv4 or IPv6 address.
# '0.0.0.0/0' can be used to allow any IPv4 address.
# Example: Server=127.0.0.1,192.168.1.0/24,::1,2001:db8::/32,zabbix.example.com
#
# Mandatory: yes, if StartAgents is not explicitly set to 0
# Default:
# Server=

Server=192.168.50.49
```

Plugin specific Zabbix agent 2 configuration

Zabbix agent 2 provides plugin-specific configuration parameters. Mostly these are optional parameters related to a specific plugin. You can find the full list of plugin-specific configuration parameters in [the Zabbix documentation](#). In the newer versions of Zabbix agent 2, the plugin-specific parameters are defined in separate plugin configuration files, located in `/etc/zabbix/zabbix_agent2.d/plugins.d/`, while in older versions, they are defined directly in the `zabbix_agent2.conf` file.

For the Zabbix agent 2 Docker plugin, we have to provide the Docker daemon unix-socket location. This can be done by specifying the following plugin parameter:

```
### Option: Plugins.Docker.Endpoint
# Docker API endpoint.
#
# Mandatory: no
# Default:  unix: ///var/run/docker.sock
# Plugins.Docker.Endpoint=unix: ///var/run/docker.sock
```

The default socket location will be correct for your Docker environment – in that case, you can leave the configuration file as-is.

Once we have made the necessary changes in the Zabbix agent 2 configuration files, start and enable the agent:

```
systemctl enable zabbix-agent2 --now
```

Check if the Zabbix agent2 is running:

```
tail -f /var/log/zabbix/zabbix_agent2.log
```

Before we move on to Zabbix frontend, I would like to point your attention to the Docker socket file permission – the zabbix user needs to have access to the Docker socket file. The zabbix user should be added to the docker group to resolve the following error messages.

```
[Docker] cannot fetch data: Get http://1.28/info: dial unix /var/run/docker.sock: connect:
permission denied
```

```
ZBX_NOTSUPPORTED: Cannot fetch data.
```

You can add the zabbix user to the Docker group by executing the following command:

```
usermod -aG docker zabbix
```

Configuring the docker host

The screenshot shows the 'New host' configuration window in Zabbix. The 'Host name' is 'Docker host'. The 'Visible name' is also 'Docker host'. The 'Templates' dropdown is set to 'Docker by Zabbix agent 2'. The 'Groups' dropdown is set to 'Linux servers'. Under 'Interfaces', there is one entry: 'Agent' with IP address '192.168.50.141', 'Connect to' set to 'IP', and 'Port' set to '10050'. The 'Default' radio button is selected. The 'Description' field contains 'Docker container host'. The 'Monitored by proxy' dropdown is set to '(no proxy)'. The 'Enabled' checkbox is checked. There are 'Add' and 'Cancel' buttons at the bottom right.

Configuring the host representing our Docker environment

After importing the template, we have to create a host which will represent our Docker instance. Give the host a name and assign it to a Host group - I will assign it to the Linux servers host group. Assign the *Docker by Zabbix agent 2* template to the host. Since the template uses Zabbix agent 2 to collect the metrics, we also have to add an agent interface on this host. The address of the interface should point to the machine running your Docker containers. Finish up the host configuration by clicking the Add button.

Docker by Zabbix agent 2 template

Name	Triggers	Key	Interval	History	Trends	Type	Status	Tags
... Docker: Get info: Docker: Architecture		docker.architecture	7d			Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: Cgroup driver		docker.cgroup_driver	7d			Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: Containers paused		docker.containers.paused	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: Containers running		docker.containers.running	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get data_usage: Docker: Containers size		docker.containers_size	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: Containers stopped		docker.containers.stopped	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: Containers total		docker.containers.total	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: CPU CFS Period enabled		docker.cpu_cfs_period.enabled	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: CPU CFS Quota enabled		docker.cpu_cfs_quota.enabled	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: CPU Set enabled		docker.cpu_set.enabled	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: CPU Shares enabled		docker.cpu_shares.enabled	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: Debug enabled		docker.debug.enabled	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: Default runtime		docker.default_runtime	7d			Dependent item	Enabled	Application: Docker
... Docker: Get info: Docker: Docker root dir		docker.root_dir	7d			Dependent item	Enabled	Application: Docker
... Docker: Get containers		docker.containers	1m	0		Zabbix agent	Enabled	Application: Zabbix ra...
... Docker: Get data_usage		docker.data_usage	1m	0		Zabbix agent	Enabled	Application: Zabbix ra...
... Docker: Get images		docker.images	1m	0		Zabbix agent	Enabled	Application: Zabbix ra...
... Docker: Get info		docker.info	1m	0		Zabbix agent	Enabled	Application: Zabbix ra...
... Docker: Get info: Docker: Goroutines		docker.goroutines	7d	365d		Dependent item	Enabled	Application: Docker
... Docker: Get images: Docker: Images available		docker.images.top_level	7d	365d		Dependent item	Enabled	Application: Docker

Regular docker template items

The template contains a set of regular items for the general Docker instance metrics, such as the number of available images, Docker architecture information, the total number of containers, and more.

Discovery rules

Host groups Type Status all Enabled Disabled

Templates Update interval

Keep lost resources period

Name

Key

Template	Name	Items	Triggers	Graphs	Hosts	Key	Interval	Type
Docker by Zabbix agent 2	Containers discovery	Item prototypes 36	Trigger prototypes 2	Graph prototypes 4	Host prototypes	docker.containers.discovery[false]	15m	Zabbix agent
Docker by Zabbix agent 2	Images discovery	Item prototypes 2	Trigger prototypes	Graph prototypes	Host prototypes	docker.images.discovery	15m	Zabbix agent

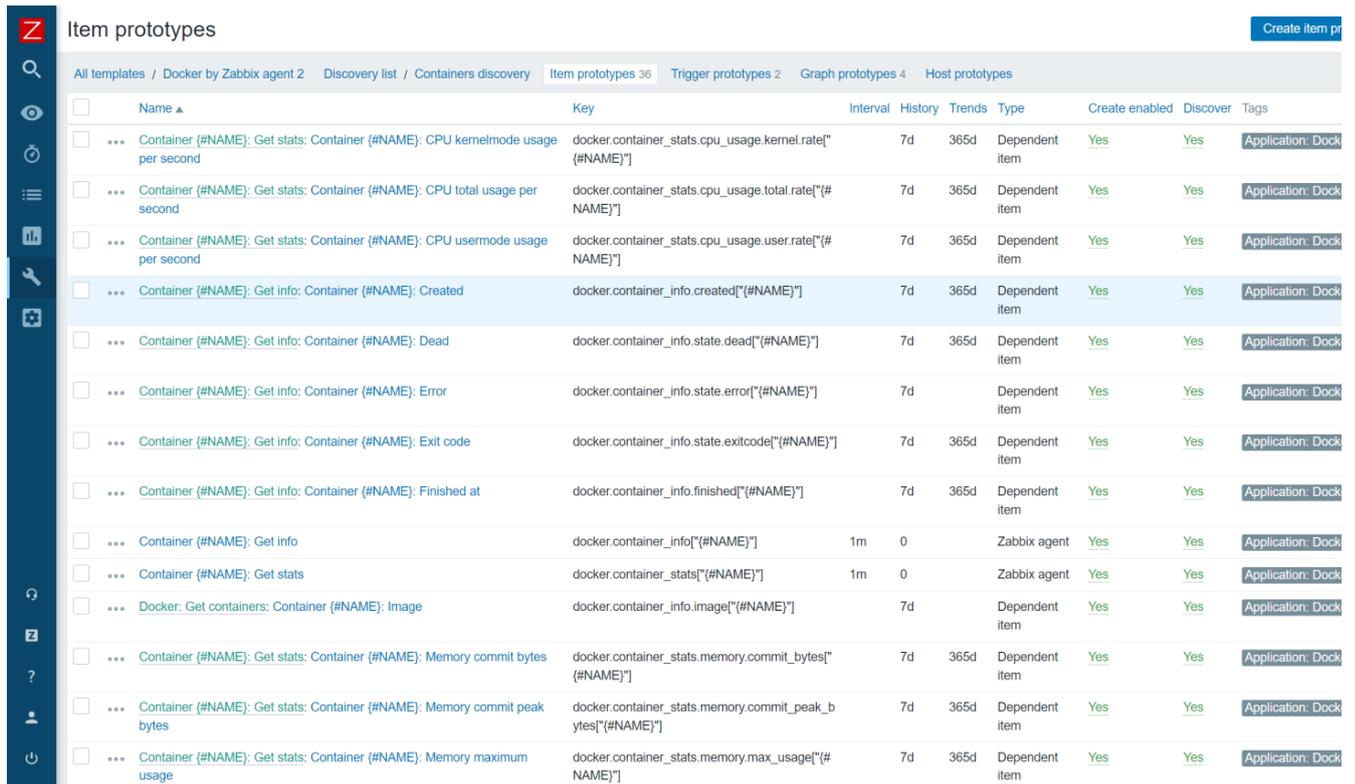
Displaying 2

Docker template Low-level discovery rules

On top of that, the template also gathers container and image-specific information by using low-level discovery rules.

Once Zabbix discovers your containers and images, these low-level discovery rules will then be used to create items, triggers, and graphs from prototypes for each of your containers and images. This way, we can monitor container or image-specific metrics, such as container memory, network

information, container status, and more.



Name	Key	Interval	History	Trends	Type	Create enabled	Discover	Tags
Container (#NAME): Get stats: Container (#NAME): CPU kernelmode usage per second	docker.container_stats.cpu_usage.kernel.rate["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get stats: Container (#NAME): CPU total usage per second	docker.container_stats.cpu_usage.total.rate["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get stats: Container (#NAME): CPU usermode usage per second	docker.container_stats.cpu_usage.user.rate["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get info: Container (#NAME): Created	docker.container_info.created["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get info: Container (#NAME): Dead	docker.container_info.state.dead["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get info: Container (#NAME): Error	docker.container_info.state.error["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get info: Container (#NAME): Exit code	docker.container_info.state.exitcode["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get info: Container (#NAME): Finished at	docker.container_info.finished["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get info	docker.container_info["#{NAME}"]	1m	0	Zabbix agent	Yes	Yes	Application: Dock	
Container (#NAME): Get stats	docker.container_stats["#{NAME}"]	1m	0	Zabbix agent	Yes	Yes	Application: Dock	
Docker: Get containers: Container (#NAME): Image	docker.container_info.image["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get stats: Container (#NAME): Memory commit bytes	docker.container_stats.memory.commit_bytes["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get stats: Container (#NAME): Memory commit peak bytes	docker.container_stats.memory.commit_peak_bytes["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	
Container (#NAME): Get stats: Container (#NAME): Memory maximum usage	docker.container_stats.memory.max_usage["#{NAME}"]	7d	365d	Dependent item	Yes	Yes	Application: Dock	

Docker templates Low-level discovery item prototypes

Verifying the host and template configuration

To verify that the agent and the host are configured correctly, we can use Zabbix get command-line tool and try to poll our agent. If you haven't installed Zabbix get, do so on your Zabbix server or Zabbix proxy host:

```
dnf install zabbix-get
```

Now we can use *zabbix-get* to verify that our agent can obtain the Docker-related metrics. Execute the following command:

```
zabbix_get -s docker-host -k docker.info
```

Use the *-s* parameter to specify your agent host's host name or IP address. The *-k* parameter specifies the item key for which we wish to obtain the metrics by polling the agent with Zabbix get.

```
zabbix_get -s 192.168.50.141 -k docker.info
```

```
{"Id": "SJYT: SATE: 7XZE: 7GEC: XFUD: KZ05: NYFI: L7M5: 4RG0: P2KX: QJFD: TAVY", "Containers": 2, "Containers Running": 2, "ContainersPaused": 0, "ContainersStopped": 0, "Images": 2, "Driver": "overlay2", "MemoryLimit": true, "SwapLimit": true, "KernelMemory": true, "KernelMemoryTCP": true, "CpuCfsPeriod": true, "CpuCfsQuota": true, "CPUShares": true, "CPUSet": true, "PidsLimit": true, "IPv4Forwarding": true, "BridgeNfIptables": true, "BridgeNfIP6tables": true, "Debug": false, "NFd": 39, "OomKillDisable": true, "NGoroutines": 43, "LoggingDriver": "json-file", "CgroupDriver": "cgroupfs", "NEventsListener": 0, "KernelVersion": "5.4.17-2136.300.7.el8uek.x86_64", "OperatingSystem": "Oracle Linux Server 8.5", "OSVersion": "8.5", "OSType": "linux", "Architecture": "x86_64", "IndexServerAddress": "https://index.docker.io/v1/", "NCPU": 1, "MemTotal": 1776848896, "DockerRootDir": "/var/lib/docker", "Name": "localhost.localdomain", "ExperimentalBuild": false, "ServerVersion": "20.10.14", "ClusterStore": "", "ClusterAdvertise": "", "DefaultRuntime": "runc", "LiveRestoreEnabled": false, "InitBinary": "docker-init", "SecurityOptions": ["name=seccomp,profile=default"], "Warnings": null}
```

In addition, we can also use the low-level discovery key - `docker.containers.discovery[false]` to check the result of the low-level discovery.

```
zabbix_get -s 192.168.50.141 -k docker.containers.discovery[ false]
```

```
[{"#ID": "a1ad32f5ee680937806bba62a1aa37909a8a6663d8d3268db01edb1ac66a49e2", "#NAME": "/apache-server"}, {"#ID": "120d59f3c8b416aaeeba50378dee7ae1eb89cb7ffc6cc75afdfedb9bc8cae12e", "#NAME": "/mysql-server"}]
```

We can see that Zabbix will discover and start monitoring two containers - `apache-server` and `mysql-server`. Any agent low-level discovery rule or item can be checked with Zabbix get.

Docker template in action

Zabbix Items

All hosts / Docker host Enabled **ZBX** Items 122 Triggers 7 Graphs 13 Discovery rules 2 Web scenarios

Name	Triggers	Key	Interval	History	Trends	Type	Status	Tags
Containers discovery: Container /apache-server: Get stats: Container /apache-server: CPU kernelmode usage per second		docker.container_stats.cpu_usage.kernel.rate["/apache-server"]	7d	365d	Dependent item	Enabled	component: cpu container: /apache-ser...	
Containers discovery: Container /apache-server: Get stats: Container /apache-server: CPU percent usage		docker.container_stats.cpu_pct_usage["/apache-server"]	7d	365d	Dependent item	Enabled	component: cpu container: /apache-ser...	
Containers discovery: Container /apache-server: Get stats: Container /apache-server: CPU total usage per second		docker.container_stats.cpu_usage.total.rate["/apache-server"]	7d	365d	Dependent item	Enabled	component: cpu container: /apache-ser...	
Containers discovery: Container /apache-server: Get stats: Container /apache-server: CPU usermode usage per second		docker.container_stats.cpu_usage.user.rate["/apache-server"]	7d	365d	Dependent item	Enabled	component: cpu container: /apache-ser...	
Containers discovery: Container /apache-server: Get info: Container /apache-server: Created		docker.container_info.created["/apache-server"]	7d	365d	Dependent item	Enabled	component: system container: /apache-ser...	
Containers discovery: Container /apache-server: Get info: Container /apache-server: Dead		docker.container_info.state.dead["/apache-server"]	7d	365d	Dependent item	Enabled	component: system container: /apache-ser...	
Containers discovery: Container /apache-server: Get info: Container /apache-server: Error	Triggers 1	docker.container_info.state.error["/apache-server"]	7d		Dependent item	Enabled	component: system container: /apache-ser...	
Containers discovery: Container /apache-server: Get info: Container /apache-server: Exit code	Triggers 1	docker.container_info.state.exitcode["/apache-server"]	7d	365d	Dependent item	Enabled	component: system container: /apache-ser...	
Containers discovery: Container /apache-server: Get info: Container /apache-server: Finished at		docker.container_info.finished["/apache-server"]	7d	365d	Dependent item	Enabled	component: system container: /apache-ser...	
Containers discovery: Container /apache-server: Get info		docker.container_info["/apache-server"]	1m	0	Zabbix agent	Enabled	component: raw container: /apache-ser...	
Containers discovery: Container /apache-server: Get stats		docker.container_stats["/apache-server"]	1m	0	Zabbix agent	Enabled	component: raw container: /apache-ser...	
Containers discovery: Docker: Get containers: Container /apache-server: Image		docker.container_info.image["/apache-server"]	7d		Dependent item	Enabled	component: images container: /apache-ser...	

Discovered items on our Docker host

Now that we have configured our agent and host, applied the Docker template, and verified that everything is working, we should be able to see the discovered entities in the frontend.

Zabbix Latest data

Subfilter affects only filtered data

TAGS
component 122 container 74 image 4

TAG VALUES
component: application 7 containers 5 cpu 21 health 1 images 5 memory 15 network 17 os 5 raw 8 storage 8 system 34
container: /apache-server 37 /mysql-server 37
image: httpd:2.4 2 mysql:latest 2

DATA
With data 114 Without data 8

Host	Name	Last check	Last value	Change	Tags
Docker host	Container /apache-server: CPU kernelmode usage per second	43s	0		component: cpu container: /apache-ser...
Docker host	Container /apache-server: CPU percent usage	43s	0.002789 %	+0.0004557 %	component: cpu container: /apache-ser...
Docker host	Container /apache-server: CPU total usage per second	43s	0.021ms	+0.00012ms	component: cpu container: /apache-ser...
Docker host	Container /apache-server: CPU usermode usage per second	43s	0		component: cpu container: /apache-ser...
Docker host	Container /apache-server: Created	10m 12s	2022-04-14 13:09:33		component: system container: /apache-ser...
Docker host	Container /apache-server: Dead	12s	False (0)		component: system container: /apache-ser...
Docker host	Container /apache-server: Error	10m 12s			component: system container: /apache-ser...
Docker host	Container /apache-server: Exit code	10m 12s	0		component: system container: /apache-ser...
Docker host	Container /apache-server: Finished at	10m 12s	0001-01-01 00:00:00		component: system container: /apache-ser...
Docker host	Container /apache-server: Get info				component: raw container: /apache-ser...
Docker host	Container /apache-server: Get stats				component: raw container: /apache-ser...
Docker host	Container /apache-server: Image	10m 39s	httpd:2.4		component: images container: /apache-ser...

Collected Docker container metrics

In addition, our metrics should have also started coming in. We can check the *Latest data* section and verify that they are indeed getting collected.

Host

Host IPMI Tags **Macros** Inventory Encryption Value mapping

Host macros **Inherited and host macros**

Macro	Effective value	Template value	Global value (c)
<code>{\${DOCKER.LLD.FILTER.CONTAINER.MATCHES}}</code>	.*		
Filter of discoverable containers			
<code>{\${DOCKER.LLD.FILTER.CONTAINER.NOT_MATCHES}}</code>	CHANGE_IF_NEEDED		
Filter to exclude discovered containers			
<code>{\${DOCKER.LLD.FILTER.IMAGE.MATCHES}}</code>	.*		
Filter of discoverable images			
<code>{\${DOCKER.LLD.FILTER.IMAGE.NOT_MATCHES}}</code>	CHANGE_IF_NEEDED		
Filter to exclude discovered images			

Macros inherited from the Docker template

Lastly, we have a few additional options for further modifying the template and the results of our low-level discovery. If you open the *Macros* section of your host and select *Inherited and host macros*, you will notice that there are 4 macros inherited from the Docker template. These macros are responsible for filtering in/out the discovered containers and images. Feel free to modify these values if you wish to filter in/out the discovery of these entities as per your requirements.

Notice that the container discovery item also has one parameter, which is defined as *false* on the template:

- `docker.containers.discovery[false]` - Discover only running containers
- `docker.containers.discovery[true]` - Discover all containers, no matter their state.

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