

Monitoring as Code

(presented by Evgeny Yurchenko)

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MEETUP '24

Manual configuration management using WebUI:

- lots of information to be entered - tedious and time consuming work
- error prone - everybody makes mistakes
- changes not tracked anywhere except audit log



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What do we want to achieve:

- define Zabbix objects configuration in a file (or set of files) so we can keep it in VCS (git)
- automate Zabbix objects configuration without any need to touch WebUI
- bring configuration to defined state discarding all changes not defined by us in file(s)



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Tools we use:



ANSIBLE

<https://www.ansible.com/>

Community.Zabbix Ansible collection

<https://docs.ansible.com/ansible/latest/collections/community/zabbix/index.html>

Source code for this demo:

<https://github.com/BGmot/meetup-monitoring-as-code>



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All VMs we want to monitor:

The screenshot shows the Akamai Linodes management interface. On the left is a navigation sidebar with icons for Linodes, Volumes, NodeBalancers, Firewalls, StackScripts, Images, Domains, Kubernetes, Object Storage, Longview, and Marketplace. The main content area displays a table of Linodes under the group 'Demo-MaC'. The table has columns for Label, Status, Plan, Public IP Address, and Region. All VMs in the list are shown with a green status indicator and 'Running' text.

Label	Status	Plan	Public IP Address	Region
Demo-MaC				
app01	Running	Linode 2 GB	172.105.102.212	Toronto, CA
app02	Running	Linode 2 GB	192.46.223.179	Toronto, CA
pgdb01	Running	Linode 2 GB	172.105.102.5	Toronto, CA
web01	Running	Linode 2 GB	172.105.7.227	Toronto, CA
web02	Running	Linode 2 GB	172.105.19.27	Toronto, CA
zabbix-db01	Running	Linode 4 GB	172.105.103.142	Toronto, CA
zabbix-server01	Running	Linode 2 GB	172.105.4.20	Toronto, CA
zabbix-web01	Running	Linode 2 GB	172.105.18.225	Toronto, CA



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Ansible inventory

```
---  
databases:  
  hosts:  
    zabbix-db01:  
      pgdb01:  
app_servers:  
  hosts:  
    zabbix-server01:  
      app01:  
      app02:  
frontends:  
  hosts:  
    zabbix-web01:  
      web01:  
      web02:  
zabbix:  
  hosts:  
    zabbix-db01:  
    zabbix-server01:  
    zabbix-web01:
```

- inventories/meetup-monitoring.yml
- Our source of truth
- Has all the hosts we want to monitor by Zabbix
- Defines hosts groupings
- A host can belong to several groups (look at zabbix-* hosts)
- Zabbix group has three servers where our running Zabbix for this demo is deployed

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Initial state: freshly deployed Zabbix

The screenshot shows the Zabbix web interface. The left sidebar contains the ZABBIX logo, a search bar, and navigation links for Dashboards, Monitoring, and Services. The main content area is titled 'Hosts' and features a table of hosts. The 'Zabbix server' host is highlighted with a red circle. The table columns include Name, Items, Triggers, Graphs, Discovery, Web, Interface, Proxy, Templates, Status, Availability, Agent encryption, Info, and Tags. The 'Zabbix server' row shows 104 items, 59 triggers, 19 graphs, 5 discovery items, and a web interface at 127.0.0.1:10050. The status is 'Enabled', availability is 'ZBX', and agent encryption is 'None'. Buttons for 'Create host' and 'Import' are visible in the top right, and a 'Filter' button is on the right side of the table. At the bottom of the table, there are buttons for '0 selected', 'Enable', 'Disable', 'Export', 'Mass update', and 'Delete'.

<input type="checkbox"/>	Name ▲	Items	Triggers	Graphs	Discovery	Web	Interface	Proxy	Templates	Status	Availability	Agent encryption	Info	Tags
<input type="checkbox"/>	Zabbix server	Items 104	Triggers 59	Graphs 19	Discovery 5	Web	127.0.0.1:10050		Linux by Zabbix agent, Zabbix server health	Enabled	ZBX	None		



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Global Ansible variables

- Special Ansible group “all”
- x_api_token used to connect to Akamai cloud
- x_zabbix_* define Zabbix credentials
- ansible_* special Ansible httpapi plugin variables

```
---
all:
  vars:
    x_api_token: !vault |
      $ANSIBLE_VAULT;1.1;AES256
      32646533353266...
      ...
      35386630383833323831
    x_zabbix_username: Admin
    x_zabbix_password: zabbix
    ansible_httpapi_port: 80
    ansible_httpapi_pass: "{{ x_zabbix_password }}"
```


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Starting with Ansible playbook (monitoring.yml)

Find out all hosts IP addresses

```
---
- hosts: all
  gather_facts: false
  tasks:
  - name: Get information about VMs
    linode.cloud.instance_info:
      api_token: "{{ x_api_token }}"
      label: "{{ inventory_hostname }}"
    register: out
    delegate_to: localhost

  - name: Use IP for host connection
    set_fact:
      ansible_host: "{{ out.instance.ipv4[0] }}"

  - name: Initialize Zabbix WebUI IP
    run_once: true
    set_fact:
      x_zabbix_web_ip: "{{ hostvars['zabbix-web01']['ansible_host'] }}"
```



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Ansible playbook: create host groups

```
---
- hosts: all
  gather_facts: false
  tasks:
  - delegate_to: "{{ x_zabbix_web_ip }}"
    vars:
      ansible_network_os: community.zabbix.zabbix
      ansible_connection: httpapi
      ansible_user: "{{ x_zabbix_username }}"
    run_once: true
    block:
      - name: Construct a list of all groups
        set_fact:
          x_host_groups: "{{ (x_host_groups | default([])) + [item.key] }}"
        when:
          - item.key != "all"
          - item.key != "ungrouped"
        loop: "{{ groups | dict2items }}"
      - name: Create host groups
        community.zabbix.zabbix_group:
          host_groups: "{{ x_host_groups }}"
```

Talking to Zabbix WebUI

We don't need these

All groups from Inventory

Host groups to be added to Zabbix



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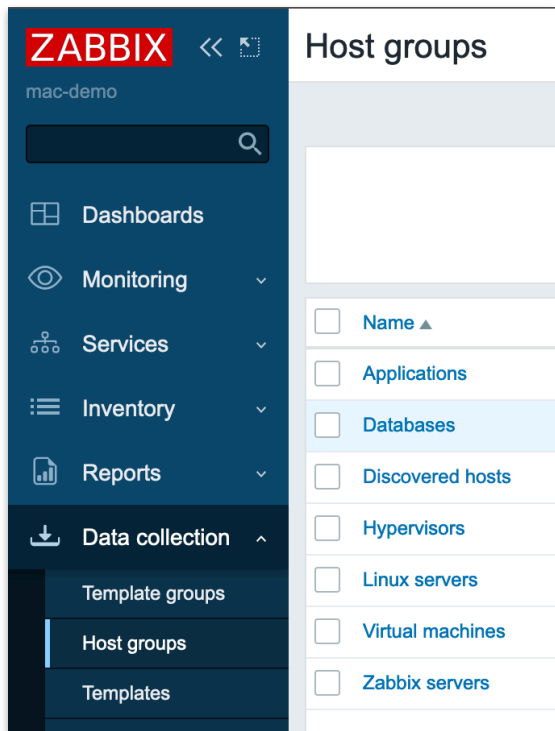
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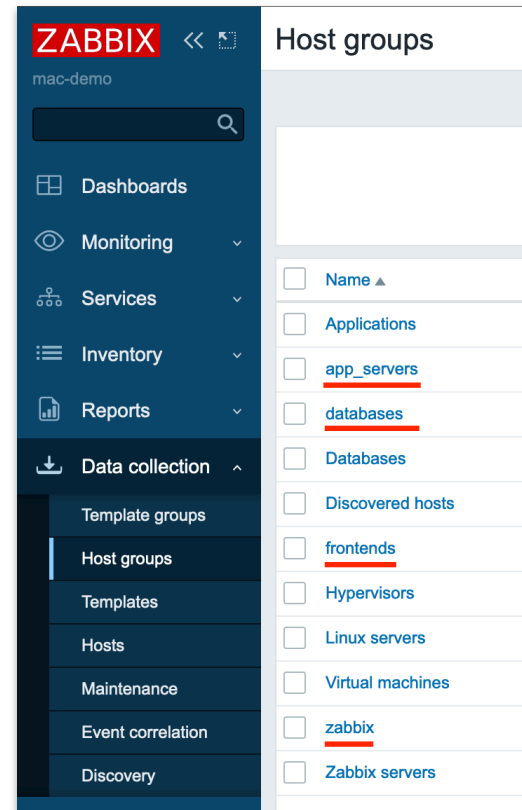
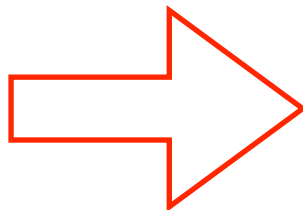
ZABBIX 

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```
$ ansible-playbook -i inventories/meetup-monitoring.yml monitoring.yml
```



Playbook run



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Ansible inventory: define templates

```
---
...
databases:
  vars:
    x_templates:
      - PostgreSQL by Zabbix agent 2
```

→ Will be applied to all hosts in “databases” group

```
...
app_servers:
  hosts:
    zabbix-server01:
      x_templates:
        - Zabbix server health
```

→ Will be applied to all hosts in “app_servers” group

```
...
frontends:
  vars:
    x_templates:
      - Apache by Zabbix agent
```

→ Will be applied to all hosts in “frontends” group



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Ansible playbook: create hosts

```
- hosts: all
gather_facts: false
vars:
  ansible_network_os: community.zabbix.zabbix
  ansible_connection: httpapi
  ansible_user: "{{ x_zabbix_username }}"
tasks:
- delegate_to: "{{ x_zabbix_web_ip }}"
  block:
  - name: "Add/update hosts"
    community.zabbix.zabbix_host:
      host_name: "{{ inventory_hostname }}"
      host_groups: "{{ group_names + ['Linux servers'] }}"
      link_templates: "{{ x_templates + ['Linux by Zabbix agent'] }}"
      interfaces:
      - type: agent
        main: 1
        useip: 1
        ip: "{{ ansible_host }}"
      state: present
```

Host name from Inventory

Inventory groups the host belongs to

Templates from Inventory

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The screenshot shows the Zabbix web interface for the 'Hosts' page. On the left is a dark sidebar with navigation menus: Dashboards, Monitoring, Services, Inventory, Reports, Data collection, Template groups, Host groups, Templates, Hosts (highlighted), Maintenance, Event correlation, Discovery, Alerts, Users, and Administration. The main content area has a header with 'ZABBIX mac-demo' and a search bar. Below the header are configuration fields for Host groups, Templates, Name, DNS, IP, Port, Status (Any, Enabled, Disabled), Monitored by (Any, Server, Proxy), Proxy, Tags, and an 'Add' button. A table below lists 9 hosts with columns for Name, Items, Triggers, Graphs, Discovery, Web, Interface, Proxy, Templates, Status, Availability, Agent encryption, Info, and Tags. A red bracket on the left side of the table highlights the first six rows, which correspond to newly added hosts. Red text at the bottom of the image reads 'New hosts added' and 'Templates assigned'. The bottom right corner shows 'Displaying 9 of 9 found'.

Name	Items	Triggers	Graphs	Discovery	Web	Interface	Proxy	Templates	Status	Availability	Agent encryption	Info	Tags
app01	43	15	8	3	Web	172.105.17.253:10050		Linux by Zabbix agent	Enabled	ZBX	None		
app02	43	15	8	3	Web	172.105.6.108:10050		Linux by Zabbix agent	Enabled	ZBX	None		
pgdb01	114	26	9	5	Web	172.105.6.183:10050		Linux by Zabbix agent, PostgreSQL by Zabbix agent 2	Enabled	ZBX	None		
web01	72	22	12	5	Web	192.46.222.137:10050		Apache by Zabbix agent, Linux by Zabbix agent	Enabled	ZBX	None		
web02	93	23	18	5	Web	192.46.222.233:10050		Apache by Zabbix agent, Linux by Zabbix agent	Enabled	ZBX	None		
zabbix-db01	114	26	9	5	Web	172.105.9.186:10050		Linux by Zabbix agent, PostgreSQL by Zabbix agent 2	Enabled	ZBX	None		
zabbix-server01	105	59	19	5	Web	172.105.6.36:10050		Linux by Zabbix agent, Zabbix server health	Enabled	ZBX	None		
zabbix-web01	72	21	12	5	Web	192.46.222.8:10050		Apache by Zabbix agent, Linux by Zabbix agent	Enabled	ZBX	None		
Zabbix server	104	59	19	5	Web	127.0.0.1:10050		Linux by Zabbix agent, Zabbix server health	Enabled	ZBX	None		

New hosts added

Templates assigned

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Ansible playbook: hosts grouping

The screenshot shows the Zabbix web interface with the 'Hosts' page selected. The left sidebar contains navigation options: Dashboards, Monitoring (Problems, Hosts, Hosts tree, Latest data, Maps, Discovery), Services, Inventory, Reports, Data collection, Alerts, Users, and Administration. The main content area displays a table of hosts grouped into categories like Linux servers, app_servers, databases, frontends, and zabbix. Each host row includes its name, interface, availability status (ZBX), tags, and various action links.

Name	Interface	Availability	Tags	Problems	Status	Latest data	Problems	Graphs	Dashboards	Web
Linux servers (8)										
app_servers (3)										
app01	172.105.14.12:10050	ZBX	class: os target: linux	Problems	Enabled	Latest data	Problems	Graphs 16	Dashboards 2	Web
app02	192.46.222.8:10050	ZBX	class: os target: linux	Problems	Enabled	Latest data	Problems	Graphs 16	Dashboards 2	Web
zabbix-server01	172.105.6.108:10050	ZBX	class: os class: software target: linux ...	Problems	Enabled	Latest data	Problems	Graphs 27	Dashboards 4	Web
databases (2)										
pgdb01	170.187.181.68:10050	ZBX	class: database class: os target: linux ...	Problems	Enabled	Latest data	Problems	Graphs 16	Dashboards 3	Web
zabbix-db01	172.105.6.36:10050	ZBX	class: database class: os target: linux ...	Problems	Enabled	Latest data	Problems	Graphs 16	Dashboards 3	Web
frontends (3)										
web01	172.105.14.187:10050	ZBX	class: os class: software target: apache ...	Problems	Enabled	Latest data	Problems	Graphs 19	Dashboards 3	Web
web02	172.105.18.225:10050	ZBX	class: os class: software target: apache ...	Problems	Enabled	Latest data	Problems	Graphs 19	Dashboards 3	Web
zabbix-web01	172.105.14.149:10050	ZBX	class: os class: software target: apache ...	1	Enabled	Latest data	Problems 1	Graphs 20	Dashboards 3	Web
zabbix (3)										
zabbix-db01	172.105.6.36:10050	ZBX	class: database class: os target: linux ...	Problems	Enabled	Latest data	Problems	Graphs 16	Dashboards 3	Web
zabbix-server01	172.105.6.108:10050	ZBX	class: os class: software target: linux ...	Problems	Enabled	Latest data	Problems	Graphs 27	Dashboards 4	Web
zabbix-web01	172.105.14.149:10050	ZBX	class: os class: software target: apache ...	1	Enabled	Latest data	Problems 1	Graphs 20	Dashboards 3	Web



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Custom Template

files/my_cool_template.json

```
{
  "zabbix_export": {
    "version": "6.4",
    "template_groups": [
      {
        "uuid": "7df96b18c230490a9a0a9e2307226338",
        "name": "Templates"
      }
    ],
    "templates": [
      {
        "uuid": "578ef40b11e040b99bfc54e7c300ad9f",
        "template": "My cool template",
        "name": "My cool template",
        "groups": [
          {
            "name": "Templates"
          }
        ],
        "items": [
          {
            "uuid": "30bfc0abb780495480806b37b53d99a9",
            "name": "Port 10050 health",
            "key": "net.tcp.port[127.0.0.1,10050]"
          }
        ]
      }
    ]
  }
}
```



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Ansible Inventory: Custom Template

```
app_servers:
  hosts:
    zabbix-server01:
      x_templates:
        - Zabbix server health
        - My cool template
      x_custom_templates_files:
        - my_cool_template.json
```

→ Add this new Template to zabbix-server01

→ This variable defines list of files to import as new Templates



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Ansible playbook: import custom Template

```
- hosts: all
gather_facts: false
vars:
  ansible_network_os: community.zabbix.zabbix
  ansible_connection: httpapi
  ansible_user: "{{ x_zabbix_username }}"
tasks:
- delegate_to: "{{ x_zabbix_web_ip }}"
  block:
  - name: Import custom templates
    community.zabbix.zabbix_template:
      template_groups: Templates
      template_json: "{{ lookup('file', 'files/' + item) }}"
      state: present
    with_items: "{{ x_custom_templates_files }}"
```

→ Import all files defined in this variable

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ZABBIX mac-demo

Hosts Filter

Host groups: Select

Templates: Select

Name:

DNS:

IP:

Port:

Status: **Any** Enabled Disabled

Monitored by: **Any** Server Proxy

Proxy: Select

Tags: **And/Or** Or

tag Contains value [Remove](#)

[Add](#)

[Apply](#) [Reset](#)

<input type="checkbox"/>	Name ▲	Items	Triggers	Graphs	Discovery	Web	Interface	Proxy	Templates	Status	Availability	Agent encryption	Info	Tags
<input type="checkbox"/>	app01	Items 76	Triggers 26	Graphs 16	Discovery 3	Web	172.105.17.253:10050		Linux by Zabbix agent	Enabled	ZBX	None		
<input type="checkbox"/>	app02	Items 76	Triggers 26	Graphs 16	Discovery 3	Web	172.105.6.108:10050		Linux by Zabbix agent	Enabled	ZBX	None		
<input type="checkbox"/>	pgdb01	Items 141	Triggers 32	Graphs 16	Discovery 5	Web	172.105.6.183:10050		Linux by Zabbix agent, PostgreSQL by Zabbix agent 2	Enabled	ZBX	None		
<input type="checkbox"/>	web01	Items 99	Triggers 28	Graphs 19	Discovery 5	Web	192.46.222.137:10050		Apache by Zabbix agent, Linux by Zabbix agent	Enabled	ZBX	None		
<input type="checkbox"/>	web02	Items 99	Triggers 28	Graphs 19	Discovery 5	Web	192.46.222.233:10050		Apache by Zabbix agent, Linux by Zabbix agent	Enabled	ZBX	None		
<input type="checkbox"/>	zabbix-db01	Items 141	Triggers 32	Graphs 16	Discovery 5	Web	172.105.9.186:10050		Linux by Zabbix agent, PostgreSQL by Zabbix agent 2	Enabled	ZBX	None		
<input type="checkbox"/>	<u>zabbix-server01</u>	Items 138	Triggers 70	Graphs 27	Discovery 5	Web	172.105.6.36:10050		Linux by Zabbix agent, <u>My cool template</u> , Zabbix server health	Enabled	ZBX	None		
<input type="checkbox"/>	zabbix-web01	Items 105	Triggers 32	Graphs 20	Discovery 5	Web	192.46.222.8:10050		Apache by Zabbix agent, Linux by Zabbix agent	Enabled	ZBX	None		
<input type="checkbox"/>	Zabbix server	Items 104	Triggers 59	Graphs 19	Discovery 5	Web	127.0.0.1:10050		Linux by Zabbix agent, Zabbix server health	Enabled	ZBX	None		

0 selected [Enable](#) [Disable](#) [Export](#) [Mass update](#) [Delete](#)

Displaying 9 of 9 found

???

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Ansible playbook: clean up hosts

```
- delegate_to: "{{ x_zabbix_web_ip }}"
  vars:
    ansible_network_os: community.zabbix.zabbix
    ansible_connection: httpapi
    ansible_user: "{{ x_zabbix_username }}"
  run_once: true
  block:
    - name: Get all currently configured hosts in Zabbix
      community.zabbix.zabbix_host_info:
        register: out
      # Lots of data about all hosts in Zabbix,
      # we need only hostnames

    - name: Build hosts list present in Zabbix
      set_fact:
        x_zabbix_hosts_list: "{{ out | community.general.json_query('hosts[*].host') }}"
      # List of only hostnames in this variable

    - name: Create a list of hosts to delete from Zabbix
      set_fact:
        x_to_delete_from_zabbix: "{{ x_zabbix_hosts_list | difference(groups.all) }}"
      # All hosts in Inventory

    - name: Delete hosts from Zabbix
      community.zabbix.zabbix_host:
        host_name: "{{ item }}"
        state: absent
      loop: "{{ x_to_delete_from_zabbix }}"
      # List of only hostnames that are not in Inventory
```



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ZABBIX mac-demo

Hosts Filter Create host Import

Host groups: Select Status: Any Enabled Disabled

Templates: Select Monitored by: Any Server Proxy

Name: Proxy: Select

DNS: Tags: And/Or Or

IP: Contains Remove

Port: [Add](#)

Apply Reset

<input type="checkbox"/>	Name ▲	Items	Triggers	Graphs	Discovery	Web	Interface	Proxy	Templates	Status	Availability	Agent encryption	Info	Tags
<input type="checkbox"/>	app01	Items 76	Triggers 26	Graphs 16	Discovery 3	Web	172.105.14.12:10050		Linux by Zabbix agent	Enabled	ZBX	None		
<input type="checkbox"/>	app02	Items 76	Triggers 26	Graphs 16	Discovery 3	Web	192.46.222.8:10050		Linux by Zabbix agent	Enabled	ZBX	None		
<input type="checkbox"/>	pgdb01	Items 141	Triggers 32	Graphs 16	Discovery 5	Web	170.187.181.68:10050		Linux by Zabbix agent, PostgreSQL by Zabbix agent 2	Enabled	ZBX	None		
<input type="checkbox"/>	web01	Items 72	Triggers 22	Graphs 12	Discovery 5	Web	172.105.14.187:10050		Apache by Zabbix agent, Linux by Zabbix agent	Enabled	ZBX	None		
<input type="checkbox"/>	web02	Items 93	Triggers 23	Graphs 18	Discovery 5	Web	172.105.18.225:10050		Apache by Zabbix agent, Linux by Zabbix agent	Enabled	ZBX	None		
<input type="checkbox"/>	zabbix-db01	Items 141	Triggers 32	Graphs 16	Discovery 5	Web	172.105.6.36:10050		Linux by Zabbix agent, PostgreSQL by Zabbix agent 2	Enabled	ZBX	None		
<input type="checkbox"/>	zabbix-server01	Items 105	Triggers 59	Graphs 19	Discovery 5	Web	172.105.6.108:10050		Linux by Zabbix agent, My cool template, Zabbix server health	Enabled	ZBX	None		
<input type="checkbox"/>	zabbix-web01	Items 78	Triggers 26	Graphs 13	Discovery 5	Web	172.105.14.149:10050		Apache by Zabbix agent, Linux by Zabbix agent	Enabled	ZBX	None		

0 selected Enable Disable Export Mass update Delete

Zabbix server host deleted! Displaying 8 of 8 found

Demo time!



... and thanks for listening!

Find more on this topic:

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