MINISTRY OF EDUCATION AND TRAINING
HO CHI MINH CITY NATIONAL UNIVERSITY
UNIVERSITY OF INFORMATION TECHNOLOGY

COURSE PROJECT
SUBJECT: NETWORK AND SYSTEM ADMINISTRATION

HO CHI MINH CITY– YEAR 2022

DETAILED REPORT

Subject: Network and System Administration

Reporting Term: Project

Topic: Zabbix

Group: Group02

1. GENERAL INFORMATION:

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2. IMPLEMENTATION CONTENT:

Num	Work	Personal responsibility	Self-assessment Result
1	Work on the project (Zabbix server, monitor website), create a demo video, write a report.	Hoang Van Anh Duc	100%
2	Work on the project (Zabbix-agent Ubuntu), create slides, edit the report.	Nguyen Thai Duong	80%
3	tWork on the project (Zabbix-agent Windows), edit slides, edit the report.	Nguyen Dinh Kha	100%

The section below of this report is the detailed report documentation by the team.

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I. Introduction

1.1 Overview

1.1.1 Definition of zabbix and what does it monitors

- Zabbix is an enterprise-class open-source distributed monitoring solution.
- Zabbix is a software that monitors numerous parameters of a network and the health and integrity of servers, virtual machines, applications, services, databases, websites, the cloud and more.
- Zabbix uses a flexible notification mechanism that allows users to configure e-mail-based alerts for virtually any event. This allows a fast reaction to server problems.
- Network monitoring:
  + Network performance.
  + Network health.
  + Configuration changes.
- Server monitor:
  + Server performance.
  + Server availability.

+ Configuration changering.
- Cloud monitoring: Google apps, Amazon WebService, Google clouds, …
- Application monitoring: Gitlab, Microsoft IIS, …
- Service monitoring: Git, Active Directory, Nginx, …

1.2. Components

1.2.1. Zabbix's Components

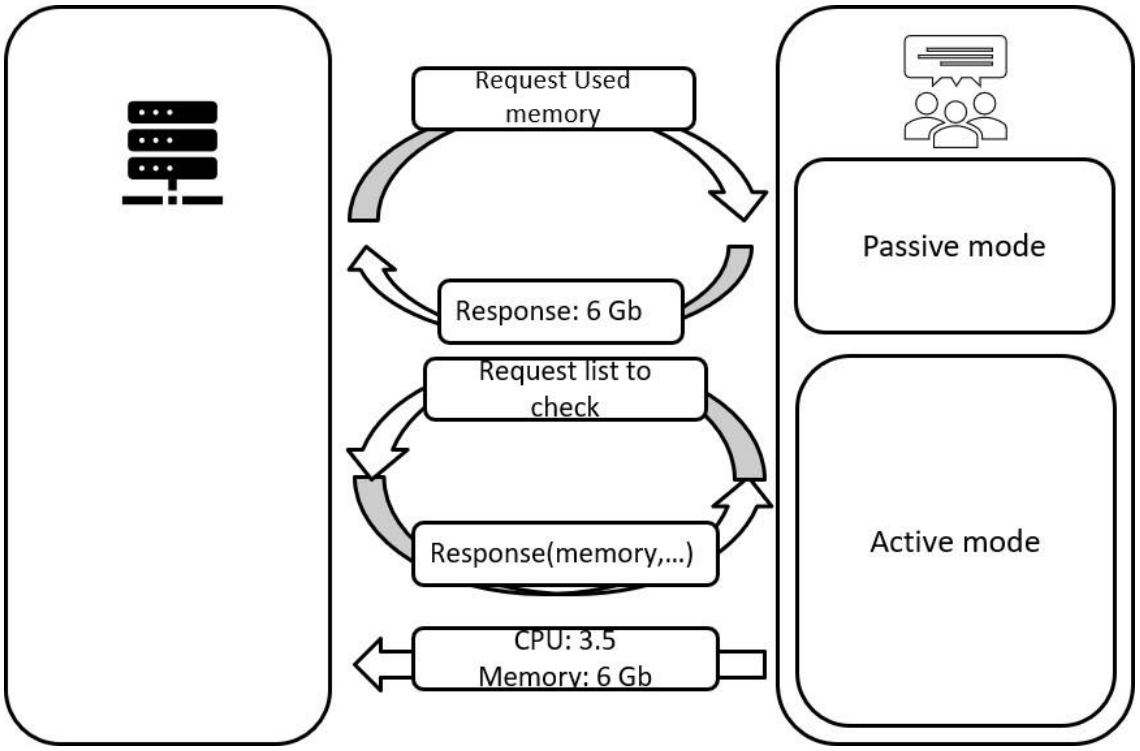
- Zabbix consists of several major software components, the responsibilities of which are outlined below:
  + **Zabbix Server**
    - This is the centre of the Zabbix software.
    - The Server can remotely check networked services (such as web servers and mail servers) using simple service checks, but it is also the central component to which the Agents will report availability and integrity information and statistics
    - The Server is the central repository in which all configuration, statistical and operational data are stored, and it is the entity in the Zabbix software that will actively alert administrators when problems arise in any of the monitored systems.
  + **Zabbix Agent**
    - In order to actively monitor local resources and applications (such as harddrives, memory, processor statistics etc.) on networked systems, those systems must run the Zabbix Agent.
    - The Agent will gather operational information from the system on which it is running and report these data to the Zabbix for further processing.
    - In case of failures (such as a harddisk running full, or a crashed service process), the Zabbix Server can actively alert the administrators of the particular machine that reported the failure.
    - The Zabbix Agents are extremely efficient because of use of native system calls for gathering statistical information.
  + **The Web Interface**
    - In order to allow easy access to the monitoring data and the configuration of Zabbix from anywhere and from any platform, the Web-based Interface is provided.
    - The Interface is a part of the Zabbix Server and is usually (but not necessarily) run on the same physical machine as the one running the Zabbix Server.

1.3. Operation

- Zabbix works via **three discovery mode** options:
  - **Network discovery** periodically scans an IT environment and records a device's type, IP address, status, uptimes and downtimes…

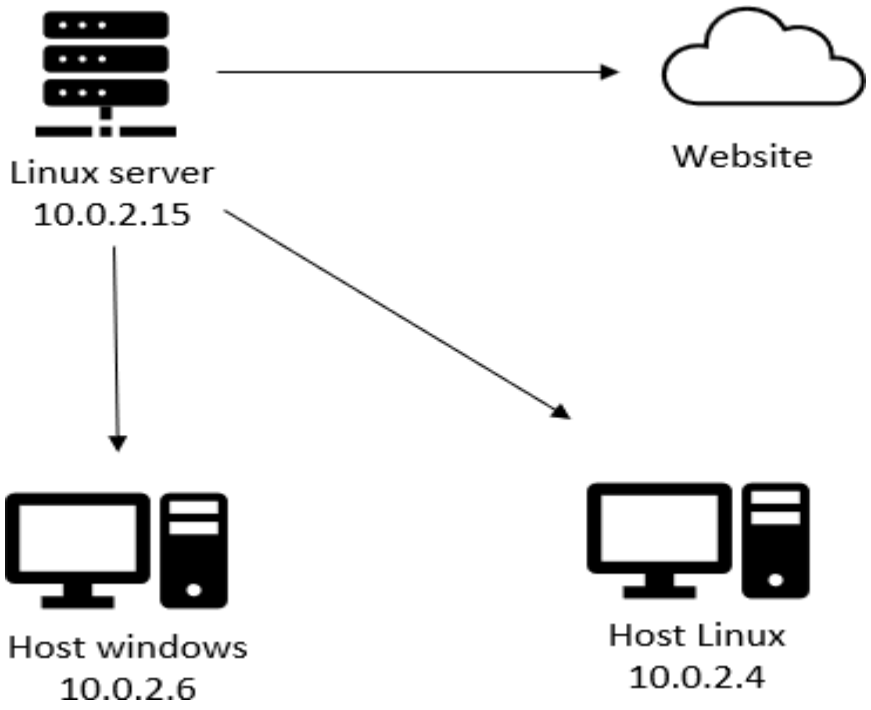
- **Low-level discovery** automatically creates items, triggers and graphs based on the discovered device. Low-level discovery can create metrics from Simple Network Management Protocol (SNMP) object identifiers, Windows services, Open Database Connectivity (ODBC) Structured Query Language (SQL) queries, network interfaces and more.
- **Auto-discovery** automatically starts monitoring any discovered device using a Zabbix agent

- Polling and trapping
  - Passive checks (polling):
    - Zabbix server requests a value from Zabbix agent.
    - Agent processes the request and returns the value to Zabbix server.
  - Active checks (trapping):
    - Zabbix agent requests from Zabbix server a list of active checks.
    - Agent sends the results in periodically.



II. Implementation and Result

2.1. Topology



2.2 Installation and Configuration

2.2.1. Setup Server

a. Install Zabbix repository

```
# wget https://repo.zabbix.com/zabbix/6.2/ubuntu/pool/main/z/zabbix-release/zabbix-release_6.2-2%2Bubuntu22.04_all.deb

# dpkg -i zabbix-release_6.2-2+ubuntu22.04_all.deb

# apt update
```

b. Install Zabbix server, frontend, agent

```
# apt install zabbix-server-mysql zabbix-frontend-php zabbix-apache-conf zabbix-sql-scripts zabbix-agent
```

Download sql-server:

```
# apt install mysql-server
```

c. Create initial database

Make sure the database server up and running.
Run the following on the host database

```
# mysql -uroot -p
password
mysql> create database zabbix character set utf8mb4 collate utf8mb4_bin;
mysql> create user zabbix@localhost identified by 'password';
mysql> grant all privileges on zabbix.* to zabbix@localhost;
mysql> set global log_bin_trust_function_creators = 1;
mysql> quit;
```

On Zabbix server host import initial schema and data. I am prompted to enter my newly created password.

```
# zcat /usr/share/zabbix-sql-scripts/mysql/server.sql.gz | mysql --default-character-set=utf8mb4 -uzabbix -p zabbix
```

Disable log_bin_trust_function_creators option after importing database schema.

```
# mysql -uroot -p password
mysql> set global log_bin_trust_function_creators = 0;
mysql> quit;
```

d. Configure the database for Zabbix server
Use tool for text editor like vim, nano, … (nano /etc/zabbix/zabbix_server.conf)

```
DBPassword=password
```

e. Start Zabbix server and agent processes
Start Zabbix server and agent processes and make it start at system boot.

```
# systemctl restart zabbix-server zabbix-agent apache2
# systemctl enable zabbix-server zabbix-agent apache2
```

Checking server's status:

```
# systemctl status aphache2
```

2.2.2 SETUP AGENT (Linux) AND CONFIGURE

a. Install Zabbix repository

```
# wget https://repo.zabbix.com/zabbix/6.2/ubuntu/pool/main/z/zabbix-release/zabbix-release_6.2-2%2Bubuntu22.04_all.deb
# dpkg -i zabbix-release_6.2-2+ubuntu22.04_all.deb
# apt update
```

b. Install Zabbix agent

```
# apt install zabbix-agent
```

c. Config file /etc/zabbix/zabbix_agentd.conf to change hostname of agent and ip which it want to connect

Nano /etc/zabbix/zabbix_agentd.conf

```
Server=10.0.2.15
```

In my work : the ip address of Server is 10.0.2.15

And the ip address of agent is : 10.0.2.4

```
ListenPort=10050
```

Listen on this port to accept connection from server.

```
ServerActive=10.0.2.15
```

```
Hostname=duc-VirtualBox
```

Config Hostname = hostname of agent

To find hostname use command : hostname in the terminal of agent

```
root@duc-VirtualBox:/home/duc# hostname
duc-VirtualBox
```

```
root@duc-VirtualBox:/home/duc# ufw status
Status: inactive
root@duc-VirtualBox:/home/duc# ufw enable
Firewall is active and enabled on system startup
root@duc-VirtualBox:/home/duc# ufw allow 10050/tcp
Rule added
Rule added (v6)
root@duc-VirtualBox:/home/duc# ufw status
Status: active

To                         Action      From
--                         ------      ----
10050/tcp                  ALLOW       Anywhere
10050/tcp (v6)             ALLOW       Anywhere (v6)
```

Check if firewall is active or not (In this work we enabble it and allow it to accept port 10050/tcp)

*If passing this step , the agent will run normally in case the firewall is not active

d. Configure the database for Zabbix server

Use tool for text editor like vim, nano, … (nano /etc/zabbix/zabbix_server.conf)

```
DBPassword=password
```

e. Start Zabbix agent process

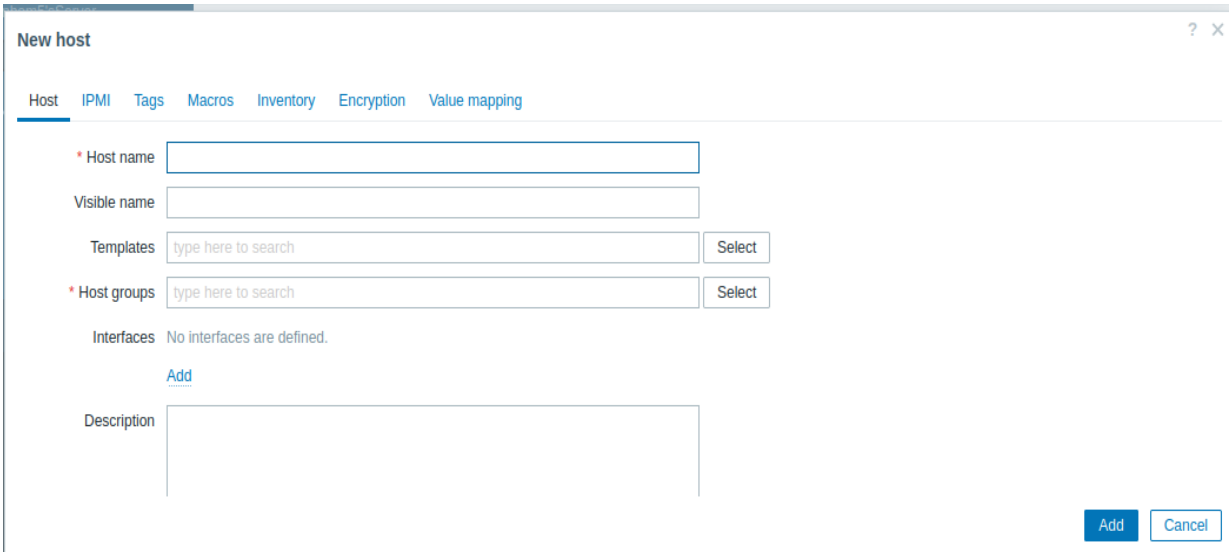
Start Zabbix agent process and make it start at system boot.

```
# systemctl restart zabbix-agent
# systemctl enable zabbix-agent
```

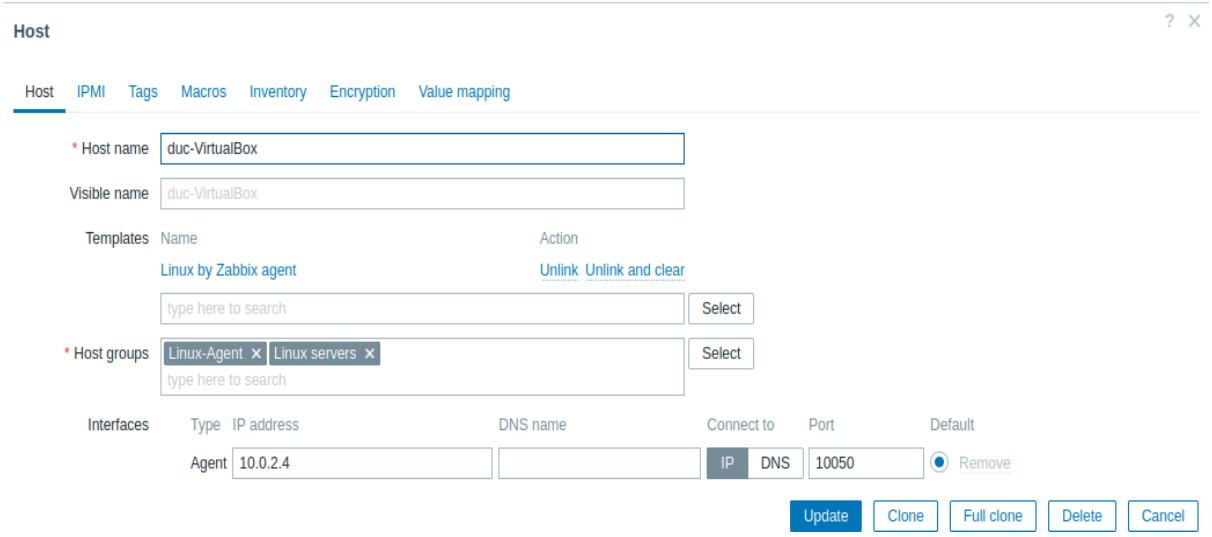
2.2.3 MONITOR FROM SERVER (use the web interface)

To monitor from server , first we have to create host by doing the following steps :

1. Go to zabbix server ‘s display
2. Click Configuration => hosts => Create host



Fill the form with information of the agent and click add:



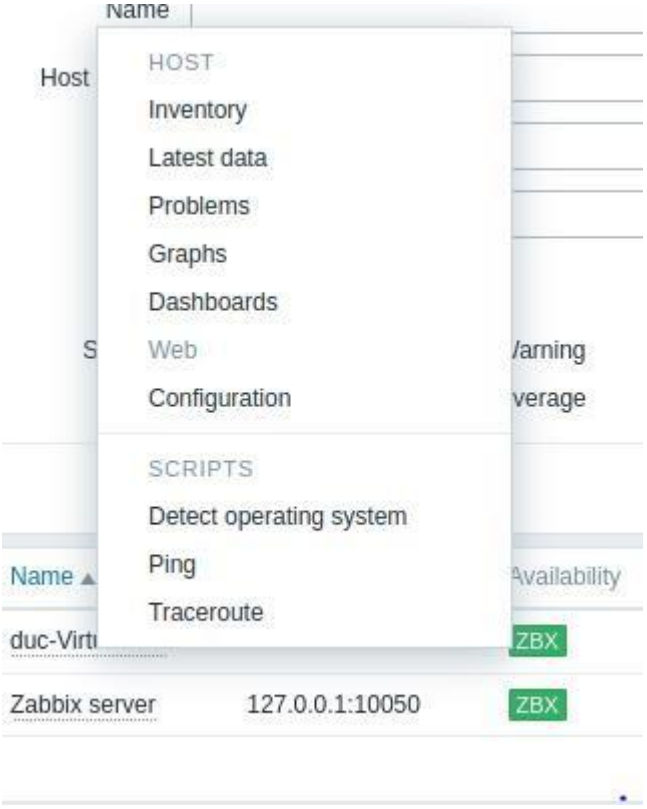
For example : My added host

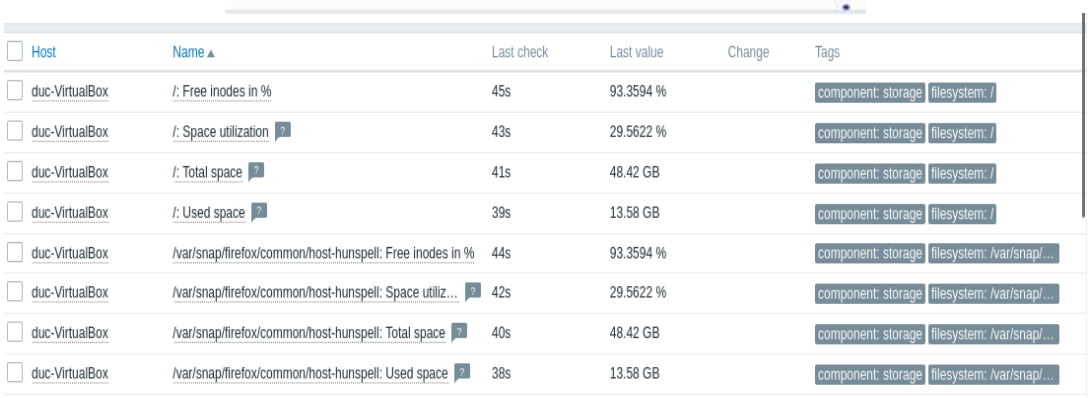
Check the connection :

Monitoring => hosts

⇨ Working fine

Then, right click on the name of agent and choose the part want to see:





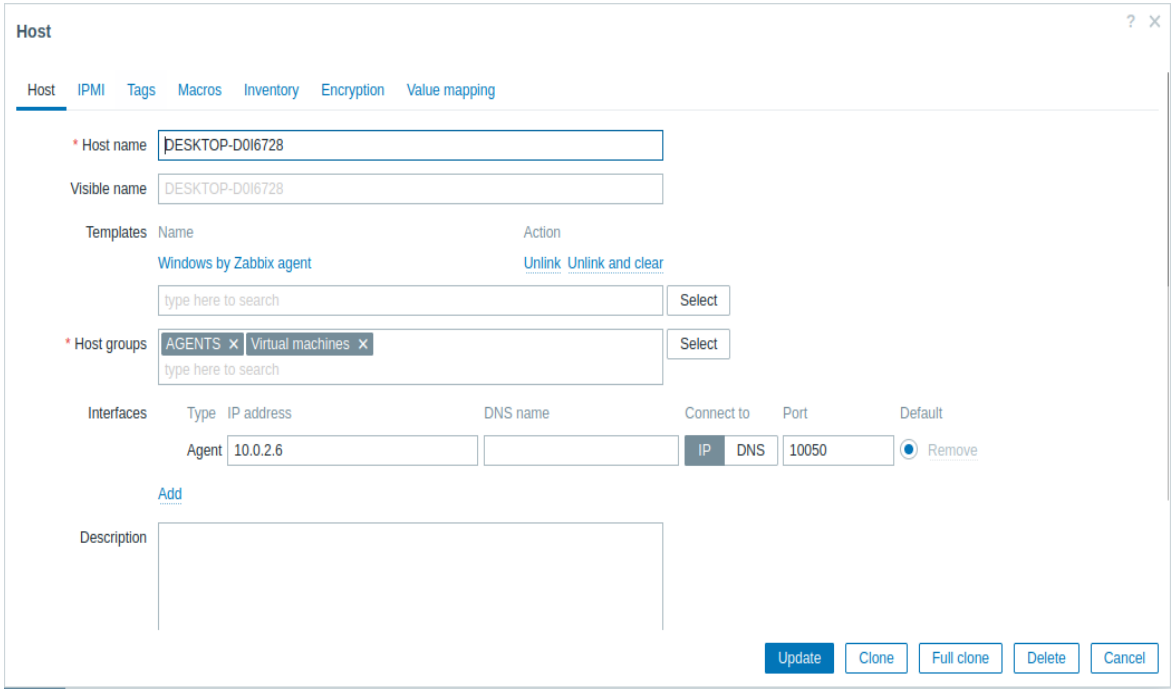
Host	Name ▲	Last check	Last value	Change	Tags
duc-VirtualBox	/: Free inodes in %	45s	93.3594 %		component: storage filesystem: /
duc-VirtualBox	/: Space utilization	43s	29.5622 %		component: storage filesystem: /
duc-VirtualBox	/: Total space	41s	48.42 GB		component: storage filesystem: /
duc-VirtualBox	/: Used space	39s	13.58 GB		component: storage filesystem: /
duc-VirtualBox	/var/snap/firefox/common/host-hunspell: Free inodes in %	44s	93.3594 %		component: storage filesystem: /var/snap/...
duc-VirtualBox	/var/snap/firefox/common/host-hunspell: Space utiliz...	42s	29.5622 %		component: storage filesystem: /var/snap/...
duc-VirtualBox	/var/snap/firefox/common/host-hunspell: Total space	40s	48.42 GB		component: storage filesystem: /var/snap/...
duc-VirtualBox	/var/snap/firefox/common/host-hunspell: Used space	38s	13.58 GB		component: storage filesystem: /var/snap/...

Choosing “ latest data “ for example

2.2.4. SETUP AGENT (WINDOW)

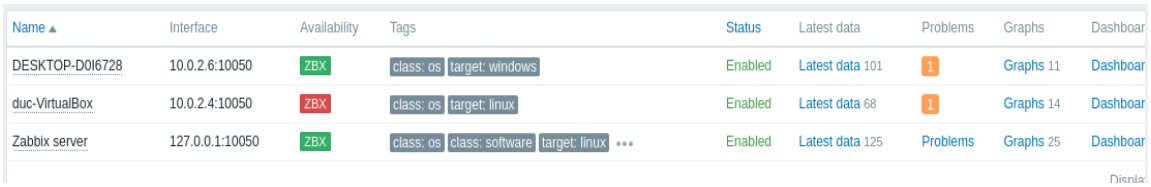
Download window agent : [Download Zabbix agents]

Install and fill the ip of zabbix server:

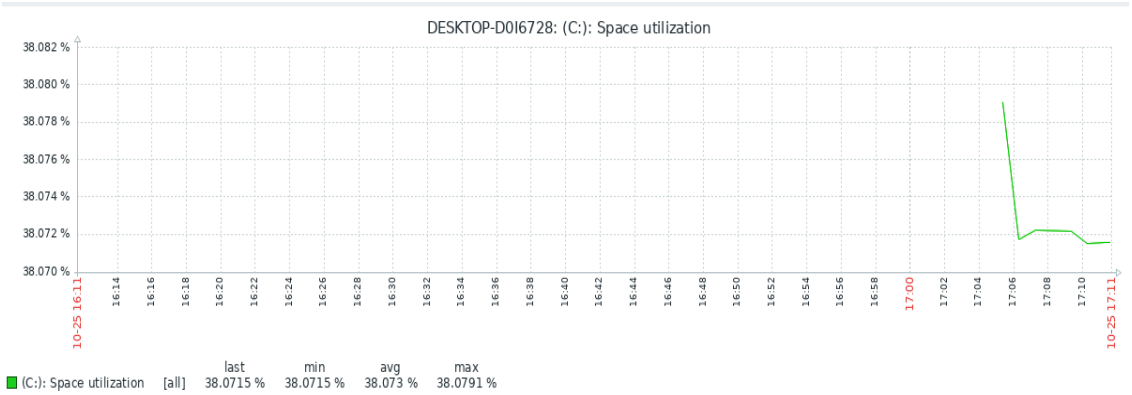


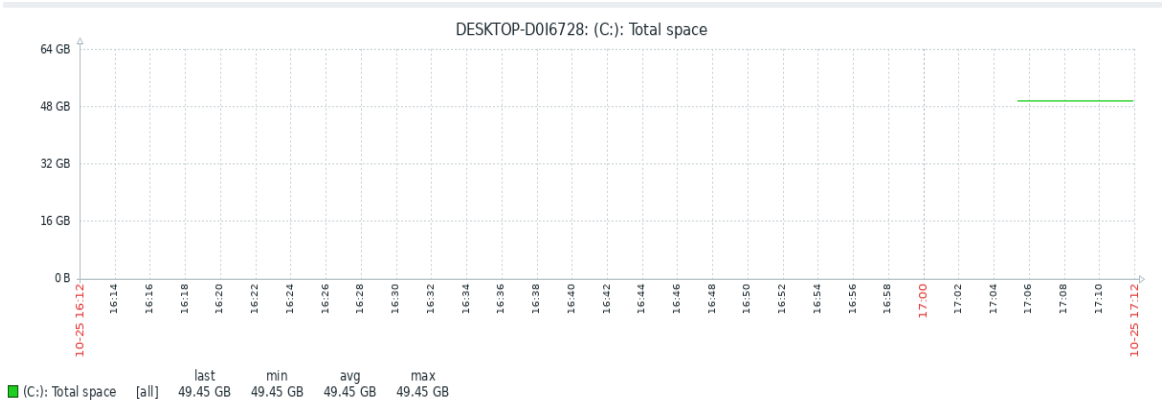
Go to server and configure client with Host name and its ip address.

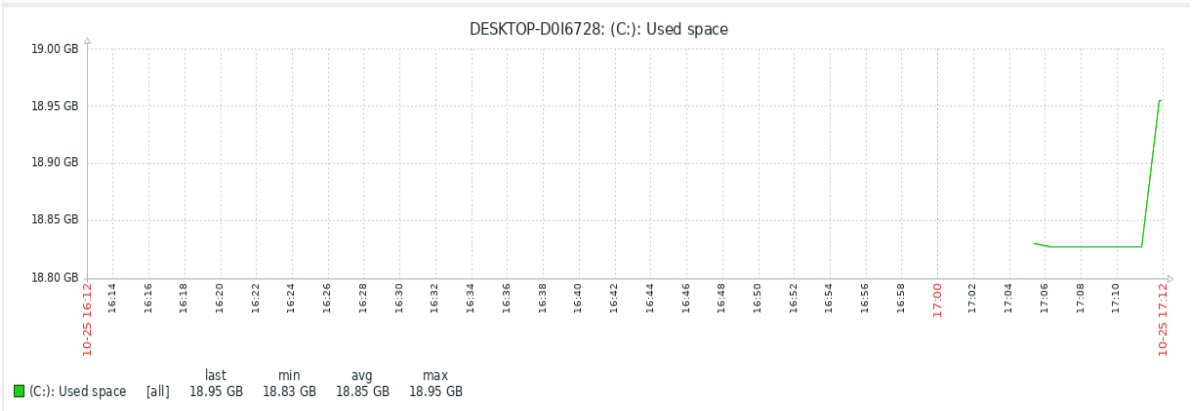
⇨ The result :

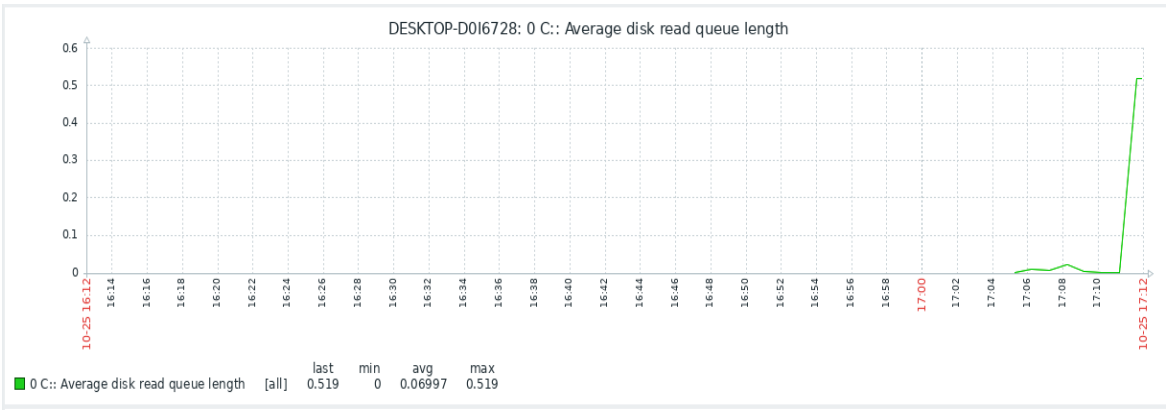


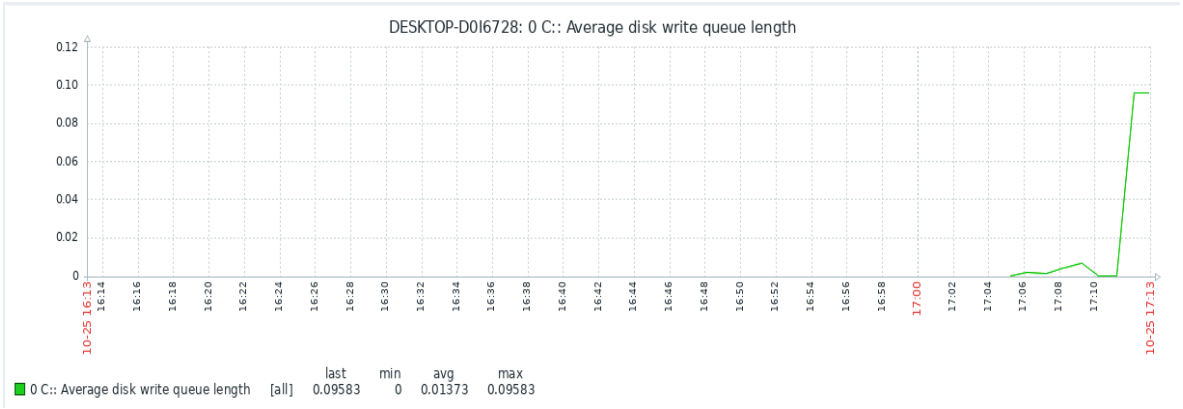
Window agent is monitored.







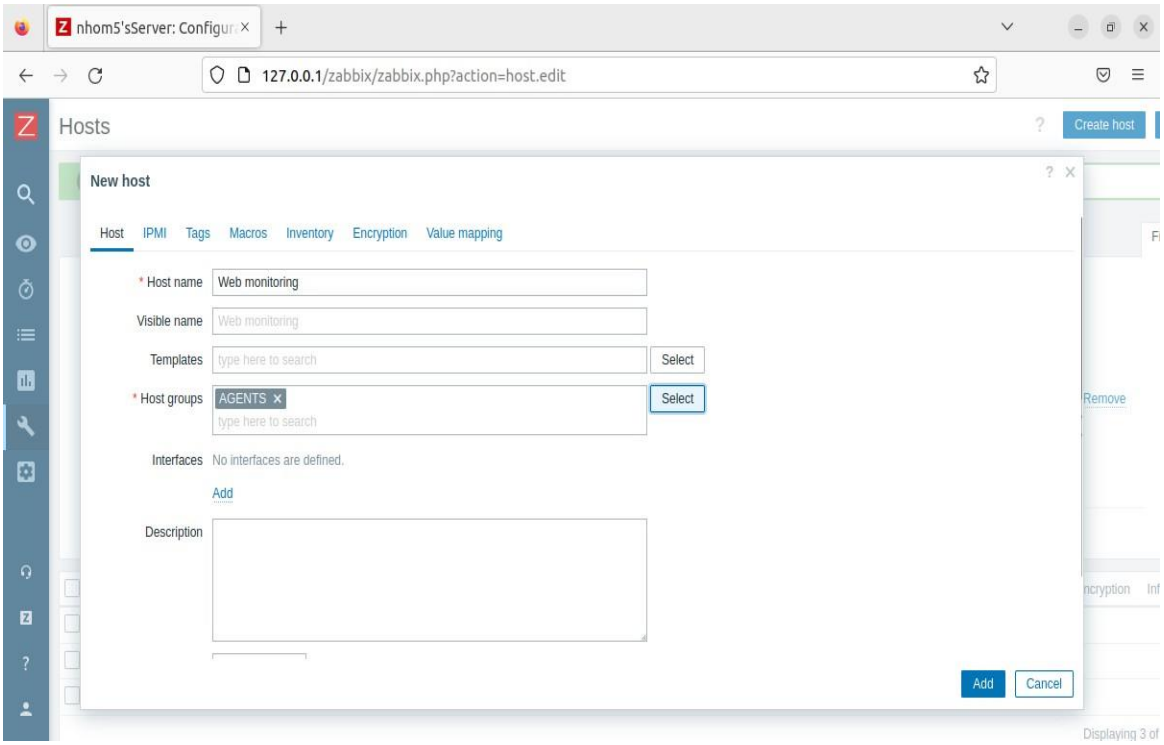




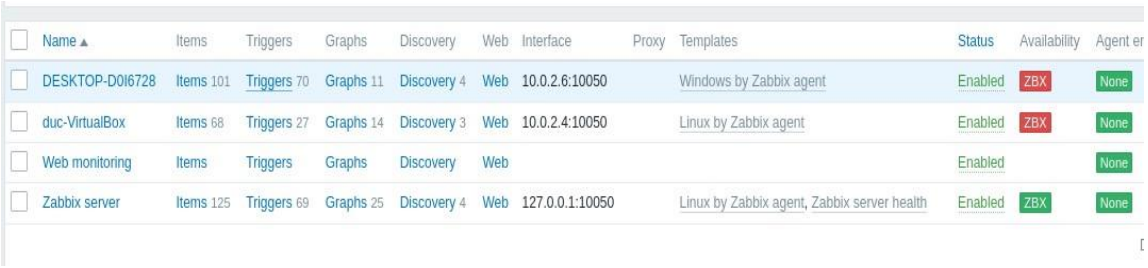
⇨ Some of its graphs‘s information.

2.2.5 Setup (WEBSERVER / WEBSITES) for monitoring

Configuration => hosts => Create host => Add

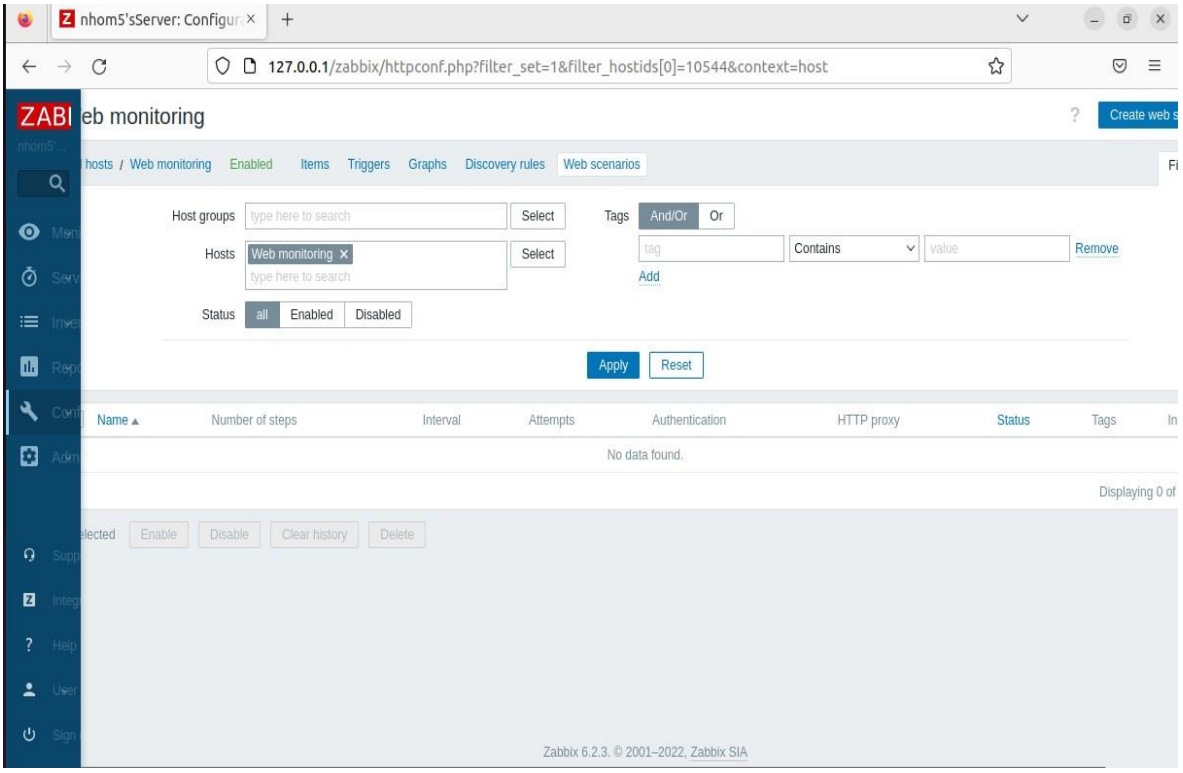


Different from window and linux monitoring , the hostname of website can be set by user opinion.

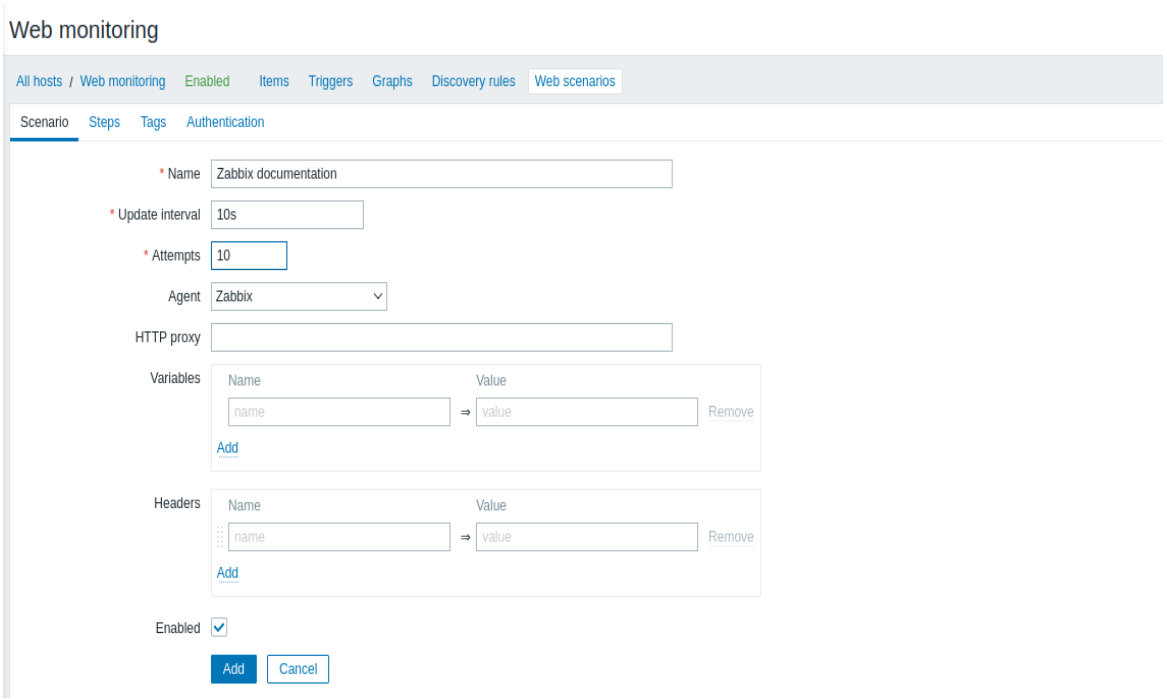


Name	Items	Triggers	Graphs	Discovery	Web	Interface	Proxy	Templates	Status	Availability	Agent er
DESKTOP-D0I6728	Items 101	Triggers 70	Graphs 11	Discovery 4	Web	10.0.2.6:10050		Windows by Zabbix agent	Enabled	ZBX	None
duc-VirtualBox	Items 68	Triggers 27	Graphs 14	Discovery 3	Web	10.0.2.4:10050		Linux by Zabbix agent	Enabled	ZBX	None
Web monitoring	Items	Triggers	Graphs	Discovery	Web				Enabled		None
Zabbix server	Items 125	Triggers 69	Graphs 25	Discovery 4	Web	127.0.0.1:10050		Linux by Zabbix agent, Zabbix server health	Enabled	ZBX	None

Click on “web” button of “Web monitoring” to configure its feature:



Next , “Create web senario” in the top right corner:



Now , there are a lot of parameters to fill in, and name’s field is optional.

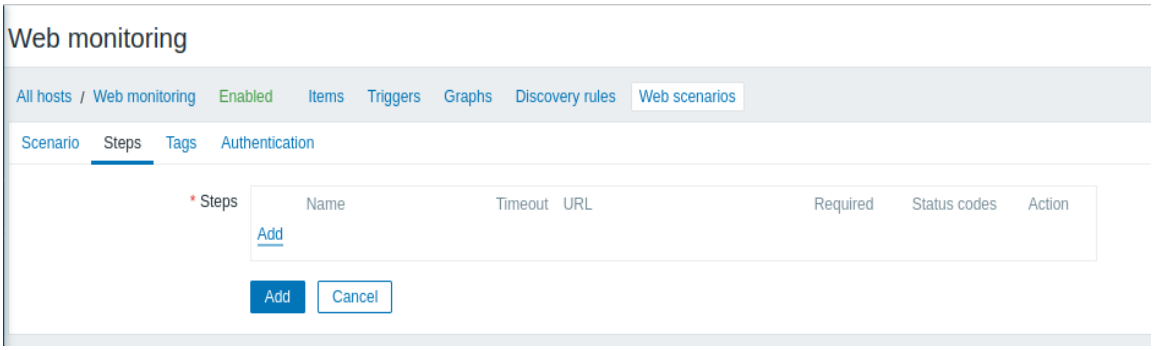
Update interval : how often user want to check our website

Attemps: how many times user want to collect data from the web

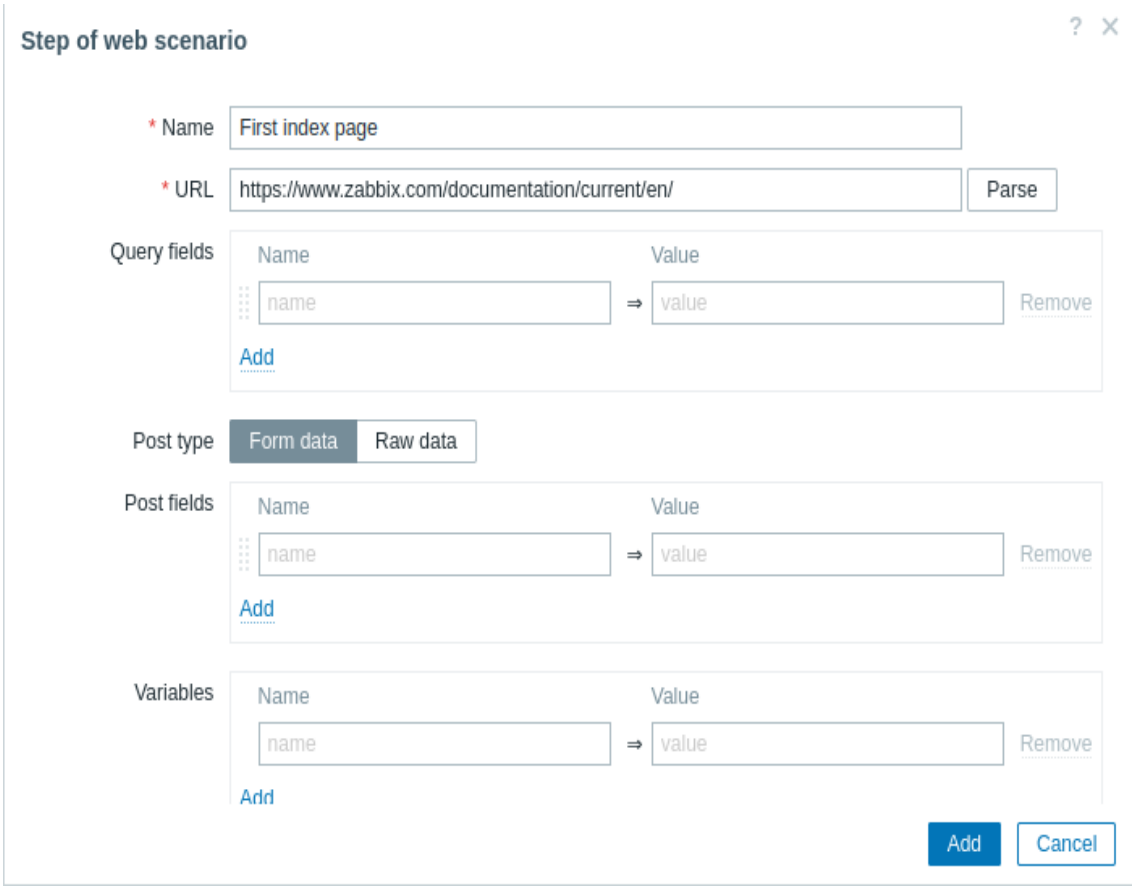
Agent: kind of browser user want to monitor

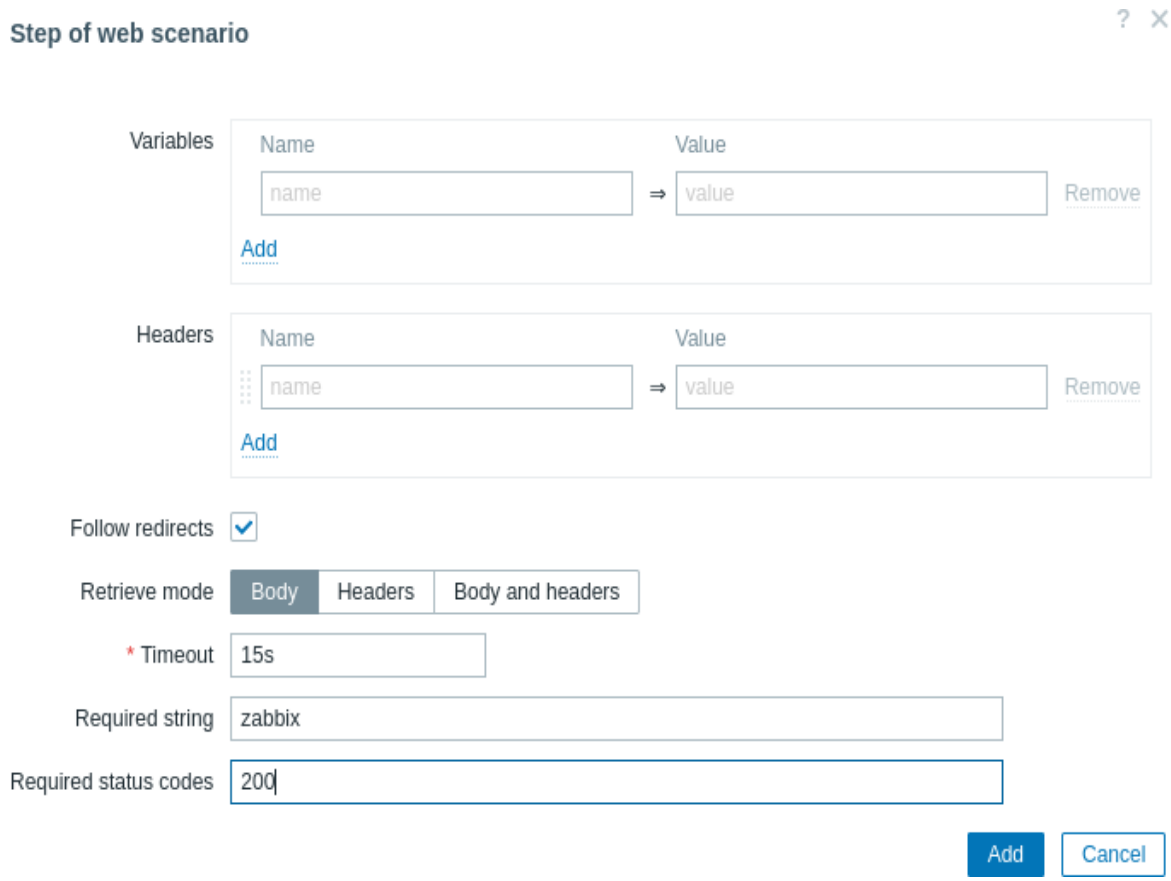
Variables and headers: the purpose of these set up is to check the page is it up or is running , check the response code

Ex: Some sort of forum , when user want to log in , post some sort of comments , verify that this comment is pushlished , …



Move to “step” and click add:





Post type : post the form data or the raw data

Post field : what kind of post fields with the values I want to add variables and headers .This is only used if I want to login , post some content and check its conditions (for the simple monitoring I'll skip this)

Follow redirects : depends on webpage's configuration . Whether this url is opening the web page right away or there is some sort of redirect

Retrieve mode : Full body or just the header of the reponses or both . Also can apply the curl request through CLI when checking some sort of the webpage

Time out : what will be the timeout for this check

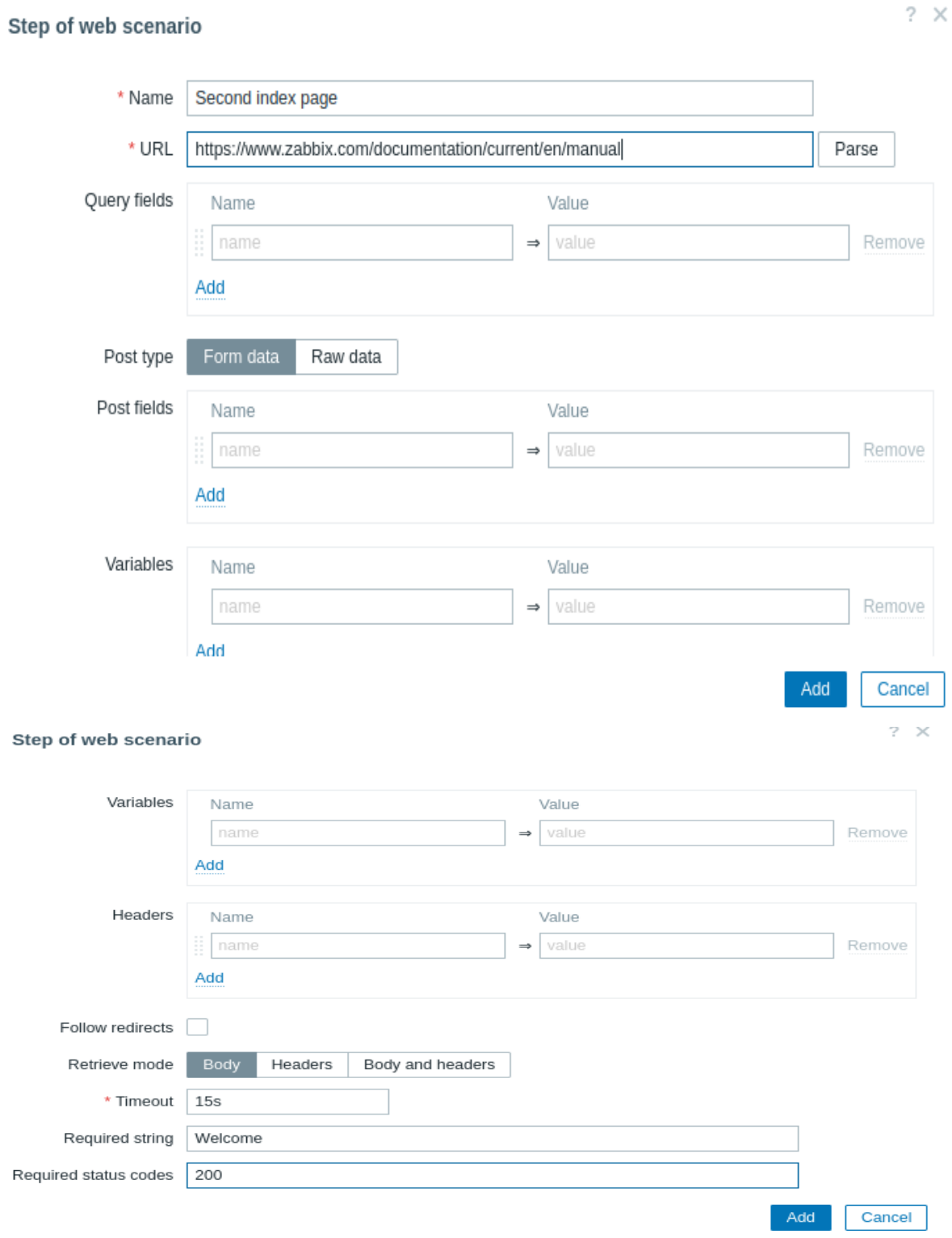
Required string : allow to check some sort of the string in the webpage I try to open . I can check for "whatever string" in the web page

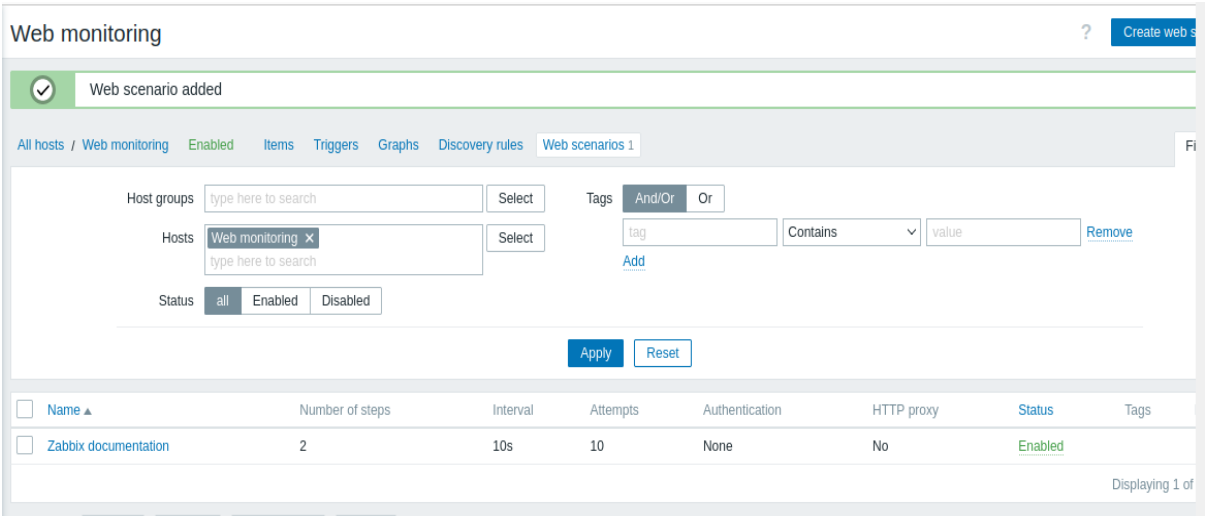
The required status code : this should be http code and if everything is correct

⇨ The expected code is 200

Click Add.

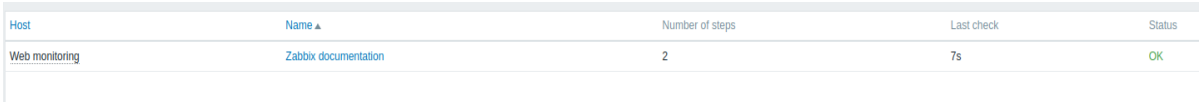
This demo I'll check two pages so this is the configuration of the second page :



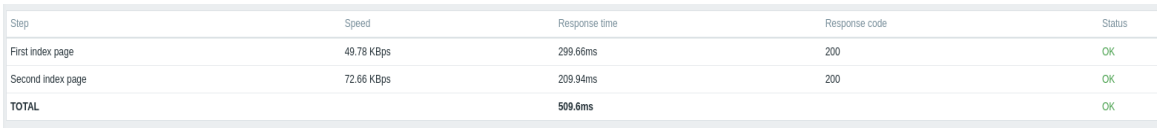


After added two steps in the scenario .Let's go to Monitoring -> Hosts

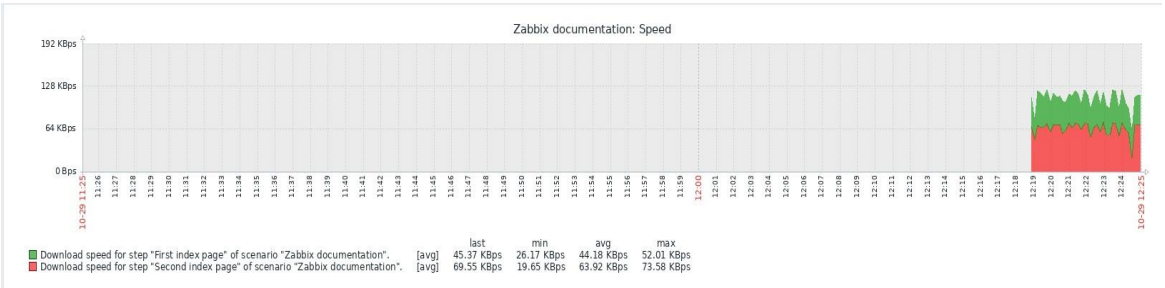
In the "Web monitoring" has the "web" with the blue color , click on it and see its status

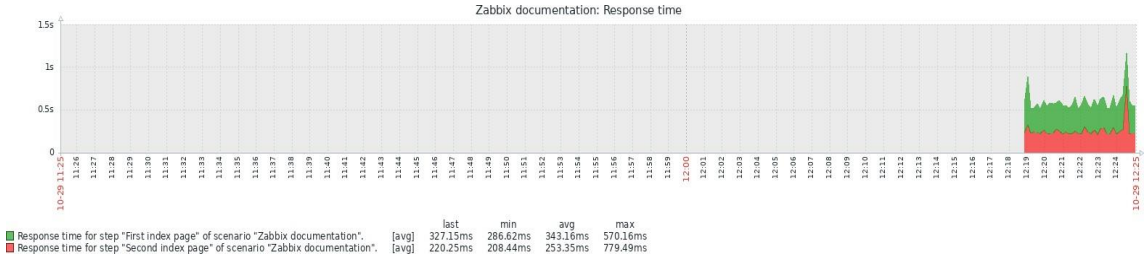


Click "Zabbix documentaion" to have a closer look



I can see its speed , response time , response code , status and its graphs





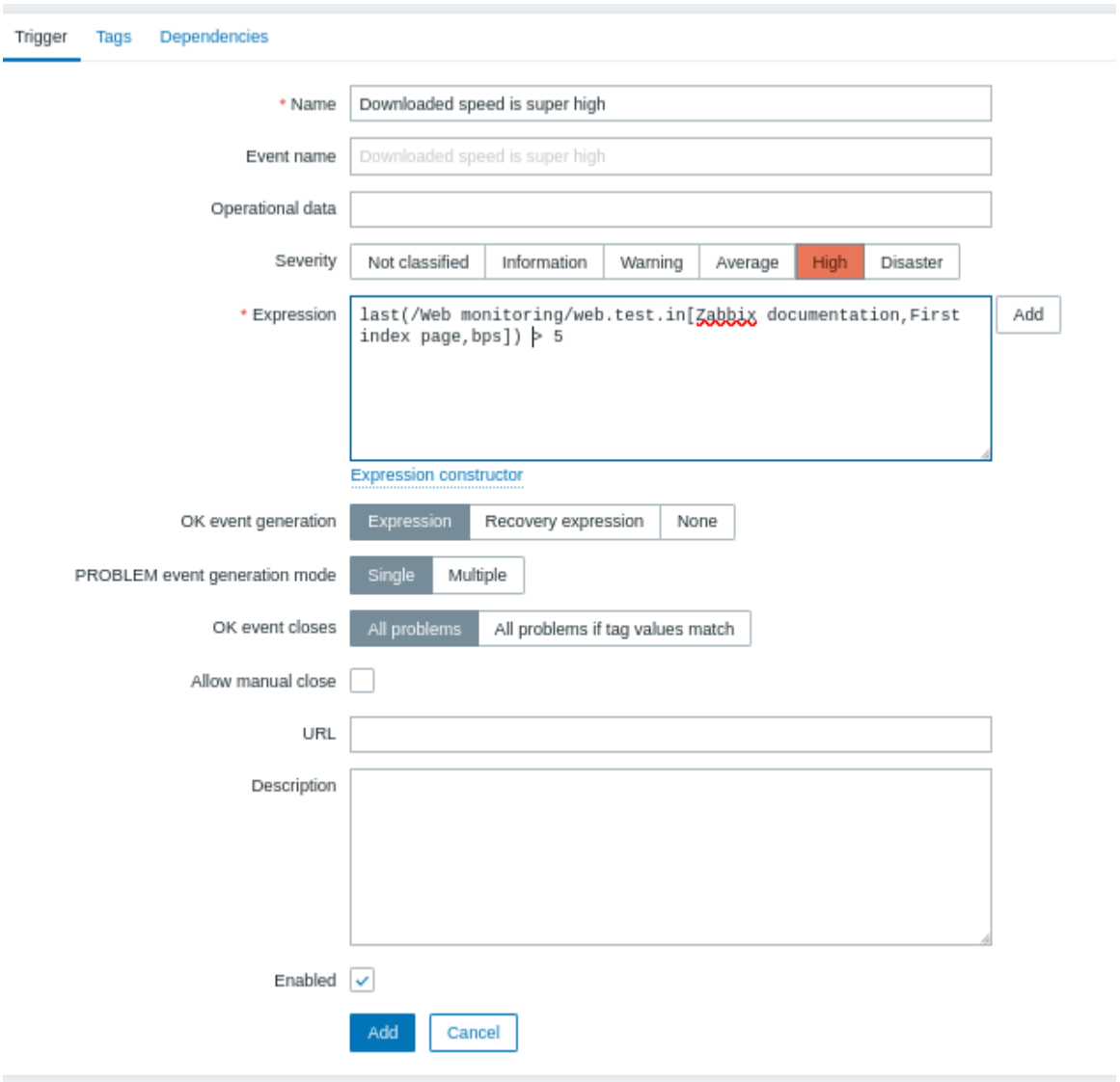
These pages don’t support javascripts so as long as I log in form is using javascript most likely I will not able use tips and tricks or whatever else to success-fully log in using the web scenario

There is no IF – ELSE . Ex : I created multiple steps no limitations , if the first step fails then all scenario fails and there is no way I can do the if else scenario

I created a trigger for my monitoration

(**Triggers** are logical **expressions** that "evaluate" **data gathered by items** and **represent the current system state**)

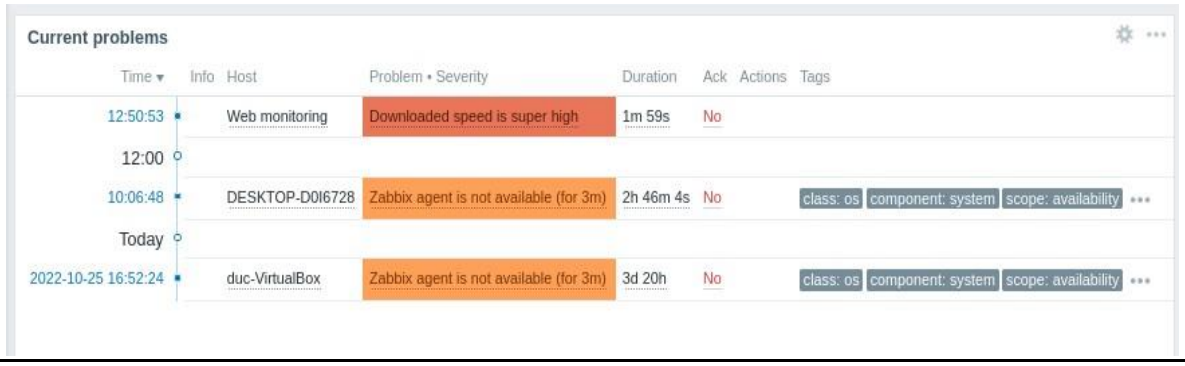
Configuration ->Hosts -> “Web monitoring” -> triggers -> Create triggers



In this trigger , I set up if last value is higher than 5 then it’ll be a high severity problem

⇨ Click add

In the previous data , the first index page’s download speed is much higher than 5 . Now I go to **Monitoring -> Dashboard-> Global view** to see what are showed .



The problems are showed .

P/s : There are more informations than just download speed , … depends on my configuration and what I want to see .

ADDITIONS : MORE ABOUT ZABBIX

Zabbix is 100% Enterprise-ready

Unlimited scalability

- From monitoring smart home to multi-tenant enterprise environments - Zabbix is scalable to any infrastructure.

Distributed monitoring

- Deploy and scale a distributed Zabbix infrastructure from a central Web UI with native encryption support between all of the components.

Secured and safe

- Keep sensitive information secure by storing it in an external vault.

High availability

- Ensure 24/7 uptime and negate the risk of data loss for Zabbix infrastructure with Zabbix high availability solution.

Flexible

- Monitor whatever we want - Zabbix comes with many different ways to collect data, transform it, analyze and visualize it.

III.SELF-ASSESSMENT

	1	2	3	4	overal
present			x		3
demo			x		3
theory				x	4
report				x	4

IV. ANSWER

1. Can zabbix monitor while on MacOS ?
    - We can't monitor on MacOS yet.
    - Consider some other operating systems that can run Zabbix server. https://www.zabbix.com/download

2. Does Zabbix operation require an interface in the Zabbix user interface?
    - A user interface is required.

3. What problems does Zabbix have when using a network larger than 1000+ nodes.
    - The demo video only shows a few clients, so installing the client through the UI is quite easy, but with over 1000 clients, this method won't be feasible. Instead, a different method will be used (Network discovery or low-level discovery).

END