Zabbix in Mining: Benefits of Host Discovery and Automatic Creation of Maps and Hosts



Vale S.A. IT Analysts ZABBIX

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Agenda

Introduction.

Our Adoption Journey.

Motivation for Change.

Comparison Between Tools.



- 1. Data Collection from PIMS.
- 2. Monitoring Dam Surveillance Cameras.

3. Discovery and Automatic Creation.

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Introduction Who we are

Gil Amaral (ZCS AS-2211-067)

- ✤ From Minas Gerais
- Married, two children
- +20 years in Telecom, Automation, Electrical, Mining, Monitoring, and Observability

Frederico Torres

- Merce de Janeiro, Living in Vitória (Brazil)
- Married to Alessandra
- ↔+30 years in Technology, Linux, DevOps
 - Observability and Project Management . . .
- ✤I Love to cook ☺





Our Adoption Journey

Started in 2012 with a commercial tool for IT only
2019 new scenario - integration between IT and OT
The previous tool worked very well for 11 years....
PoC with Zabbix started in mid-2021
Zabbix Go Live in April 2023 (monitoring 30 K hosts)
What makes Zabbix stand out:

✓ Reliable, Flexible, Scalable

Costs (annual savings of + US\$ 1 MM)

Of course, the most important thing of all... Zabbix never stops!





Statistics

Vale & Zabbix Scenario

- ✤ 10 Servers



- ✤ 60 Proxies
- ✤ 45 K Hosts



SNMP

✤ 7.2 MM items





✤ 4.0 K NVPS



✤150 K employees

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- हेंही, 사 in 30 countries
- ((w) LTE, WiMAX, LoRa, MPLS, SDH, Radio, DWDM, SDN, 280 Energy, Automation, loud





Case 1

Data Collection from PIMS

Plant Information Management System

Case 1 – Data Collection from PIMs Overview

Before Zabbix "we" couldn't collect data from the OT environment

- The device was not connected to the network
- The data was too sensitive to be available
- The device is critical

What is a PIMS System?

Plant Information Management System

PIMS stores all information from various sources of an industry, allowing data visualization.

Each item is called a TAG and we have +700 K







Case 1 – Data Collection from PIMs Real-world problem in the field

Scenario

The Production Line stops every time the equipment (BWE) gets close to the antenna due to RF saturation caused by high radio TX Power.

≁2023:

✓ 12h stoppage

✓ + 7 Kt transported

✓ + \$ 700 K USD

✤Objective:

- ✓ Reduce exposure to risks for maintenance teams
- ✓ Reduce failures due to RF saturation
- ✓ Cost Avoidance



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Case 1 – Data Collection from PIMS

Solution HTTP GET Collections even TAGs registered The Template ha

The PI System JSON format to

FEKS_BI

* Name	PI System Webld GET		
Туре	HTTP agent V		
* Key	pi.get.webid		
Type of information	Text ~		
* URL	https://valed		Parse
Query fields	Name III name Add	Value ⇒ value	Remove
Request type	POST V		
* Timeout	10s		
Request body type	Raw data JSON data XML data		
Request body	{		
	"TagGet": { "Method: "GET", "Resource": "https://va "Headers": { "Cache-Control": "no-cache" } }	.?path=\\{\$PATH}\\{HC	DST.HOST}&select
Headers	<pre>"TagGet": { "Method: "GET", "Resource": "https://va "Headers": { "Cache-Control": "no-cache" } } Name Cocp-Apim-Subscription-Key Add</pre>	Ppath=\\{\$PATH}\\{HO Value ⇒ {\$TOKEN.API}	DST.HOST}&select





•Case 1 - Data Collection from PIMs Real-world solution in the field



BWE in Motion

RF Saturation

Maintenance Activation



Case 1 – Data Collection from PIMs

Zabbix send remote command to adjust TX Power

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Case 2

Monitoring Dam Surveillance Cameras



https://github.com/vsmjoao14/zabbix-monitoring-camera-recording

Monitoring Dam Surveillance Cameras

Legally obligated to retain the images for 90 days

- How we did before Zabbix
 - The work was all done manually by a human analyst
 - Needed to validate if all 100 cameras were functioning
 - Check the cameras recordings
 - Validate the images

This work took around 4 hours per day. Even so, it was still susceptible to human error.











Camera Recording Validation

Linux Shell Script - FFmpeg Utility

- We use Zabbix to access the Network Video Recorder to validate
 - If the images are being recorded
 - How long are these images stored
 - How much time do we have left to store more images

Alarms on triggers

- Camera is not recording
- Camera with less 90d recording

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Benefits of Automation

Time Reduction:

The inspection that previously took 4 hours is now completed in just 3 seconds.

• Efficiency:

Automation eliminates the possibility of human errors, ensuring a reliable inspection.

- Real-Time Monitoring:
 The colorful dashboard allows analysts to quickly identify items that need attention.
- Increased Productivity:

With the reduction in inspection time, analysts can focus on other important tasks.

Resulting in significant time savings, decision-making and increasing productivity.

Unified Visualization Dashboard

	TOTAL CAME	RAS						CURRENT PRO	BLEMS				
	56		Host				Savarity	Problem					Act.
B5-SU-BR-MCD-CAM1 - 1			R-MCD-CAM1 - 10.37.42.2	SD-CAM1 - 10 37 42 2			OT BRNLI3 MINA-MUTUCA BARRAGEM-B5 NETWORK 10.37.42.2: CAM not recording on NVR MAC						
RECORDING TAQUAR			UARAS-SU-BR-OE-CAM1 - 10.37.42.8			Information	OT I BRNLIS I MINA-CAPAO-XAVIER I BARRAGEM-TAQUARAS I NETWORK I 10.37.42.8: CAM not recording on NVR MAC						
55 FORQUI			FORQUILHA-II-SU-BR-OD-CAM3 - 10.21.42.134			Information	OT BROPO5 MINA-FABRICA BARRAGEM-FORQUILHA-HI NETWORK 10.21.42.134: CAM not recording on NVR MAC						
NO RECORDING													
				Previous Page 1 of 1 50 rows V Next									
forquilha-iii-su- br-of-cam2- 10.21.42.4 1000 %	взв4-su-br-fr- самз - 10.22.42.5 100 %	85-SU-BR-EX-CAM2 - 10.37.42.3 100 %	BARNABE-SU-BR- MC-CAM1 - 10.21.42.15 100 %	HORIZONTES-SU- BR-OE-CAM1 - 10.40.42.2 1000 %	cianita-i-su-br- od-cami - 10.28.42.2 1000 %	cianita-i-su-br- oe-cam2- 10.28.42.3 1000 %	GRUPO-SU-BR-OD- CAM1 - 10.21.42.9 100 %	5-mac-su-br-od- cam2-10.25.42.3 100 %	MENEZES-II-SU-BR- OD-CAM1 - 10.24.42.4 100 %	VARGEM-GRANDE- SU-BR-RE-CAM1 - 10.36.42.4 93.2 %	vargem-grande- su-dq-od-gam2- 10.36.42.5 84.0 %	vargem-grande- su-br.mce-cam3 - 10.36.42.6 1000 %	FORQUILHA-I-SU- BR-OE-CAM2 - 10.21.42.129 100 %
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Forquilha-ii-su- BR-OD-CAM2- 10.21.42.48 1000 %	area-1x-su-br-fr- cam2 - 10.21.42.58 1000 %	viga-b7-su-br-oe- cam1 - 10.11.42.103 1000 %	area-1x.su-br-fr CAM1 - 10.21.42.61 99.4 %	Camera- 10.26.42.11 1000 %	viga-b7-su-br-od- cam2 - 10.11.42.106 99.4 %	Forquilha-III-SU- BR-OD-CAM3 - 10.21.42.47 99.8 %	FORQUILHA-I-SU- BR-FR-CAM1 - 10.21.42.17 0%	Forquilha-iv-su- br-fr-cam2 - 10.21.42.77 1000 %	b7.su-br-dr-cam1 - 10.11.42.101 1000 %	B3B4-SU-BR-OD- CAM4 - 10.22.42.16 1000 %	DIQUE-B-SU-DQ-OD- CAM2 - 10.40.42.8 100 %	FORQUILHA-V-SU- BR-OE-CAM1 - 10.21.42.6 99.6 %	capao-da-serra- su-br-od-defog- 10.22.42.70 1000 %
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Case 3

Host Discovery and Auto Map Creation



https://github.com/matheuskshn/Zabbix-Map-Manager

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Challenges and Motivation

Previous Tool:

- The tool was reliable and effective for 11 years
- Generating maps and host connections automatically
- Just required indicating the' network IP address
- Current Situation with Tool Migration:
 - We need to manually create more than 800 maps
 - Add about 30,000 devices
 - Make connections between them and create all triggers and alarms



First Version – Map Creation

First draft:

- Create maps more easily and quickly
- Discover the neighborhood
- Reduce the incidence of errors
- Create a standard for icons, colors and shapes

First Version – Map Creation

- Python + PyZabbix (Started via terminal)
 - Based on a hostgroup
 - Size (based on the number of hosts)
 - Each element was created with Label
 - Icons based on the hostname pattern



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Second Version – Link between hosts

- Implemented link creation between hosts
 - Feed the Ansible inventory with target IPs
 - CDP playbook Ansible
 - Txt output "show cdp neighbors"
 - Python script transforms txt into csv
 - Collect neighbor IDs in Zabbix
 - Using the csv file inserted into the script
 - Based on the IDs, it created map elements with their links





	Item prototypes				,	
	All templates / VALE - TEMP CISCO SNMP - C	CDP DISCOVERY Discovery list / Cisco cdp neighbors discovery Item proto	types 1 Trigger prototypes Graph prototypes Hos	t prototypes		
	Di: * Name Type	cdpNeighbor - neighborName({#NEIGHBORDEVNAME}) DevicePort({#NEIGHE	BOF			
	* Key	cdp.neighbor.name.index[{#SNMPINDEX}]	cdp peintbox name indev[10116-141]	1d 0d	SNMP agent	Disabled
····	Cisco cdp neighbors discovery: cdp.Veighbor - neighborName(RADIO-DC		cdp.neighbor.name.index[10110.141]	1d 0d	SNMP agent	Disabled
	Cisco cdo neighbors discovery: cdp/reighbor - neighborName(APC-5A-2)	cdp.neighbor.name.index[10117.151]	1d 0d	SNMP agent	Disabled	
····	Cisco cdp neighbors discovery: cdpNeighbor - neighborName(SE-VILA-C	cdp.neighbor.name.index[10117.152]	1d 0d	SNMP agent	Disabled	
····	Cisco cdp neighbors discovery: cdpNeighbor - neighborName(Base-Edifi	cdp.neighbor.name.index[10117.153]	1d Od	SNMP agent	Disabled	
 	Cisco cdp neighbors discovery: cdpNeighbor - neighborName(SKIGWEB	D5DE3760.valenet.valeglobal.net) DevicePort(FastEthernet0/0)	cdp.neighbor.name.index[10120.113]	1d 0d	SNMP agent	Disabled
	Cisco cdp neighbors discovery: cdpNeighbor - neighborName(BRVIX5CC	DRESW003.valenet.valeglobal.net) DevicePort(GigabitEthernet8/6)	cdp.neighbor.name.index[10125.1]	1d Od	SNMP agent	Disabled
-	* History storage period	Do not keep history Storage period				
	Description					
	Create enabled					
	Discover					
		Update Clone Test Delete Cancel	VCO			

•



Nome do Mapa

.

1

6

Informe o nome do mapa que deseja criar:

Exemplo: VALE/IT/BRAZIL/ES/VITORIA/BRVIX5/CPD-DATACENTER

Adicionar um grupo de hosts

Adicionar hosts

Adicionar IPs

Adicionar hosts por filtro

Criar Link entre os elementos

Adicionar Trigger nos links

• Who Making it Happen: The Hidden Heroes!

Allan Dymitri

Heitor Cortat

Marcos Vinicius

Anderson Carvalho

Higor Campos

Matheus Lino

Douglas Ponciano

Igor Soares

Maycon Borges

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Edson Nunes

João Victor

Nikolas Ferreira

Euzebio Viana

Lucas de Oliveira

Thiago Campos

Fabiana Milanez

Marcell de Oliveira

Wanderson Pamplona

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Thank You All !

Vale S.A. IT Analysts

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