

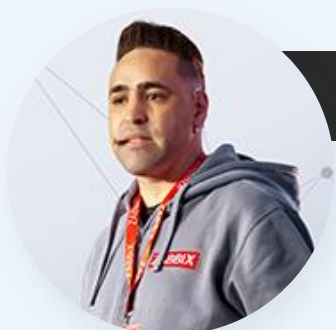
Zabbix in Action

Smart Monitoring with
Discovery, Correlation, and AI



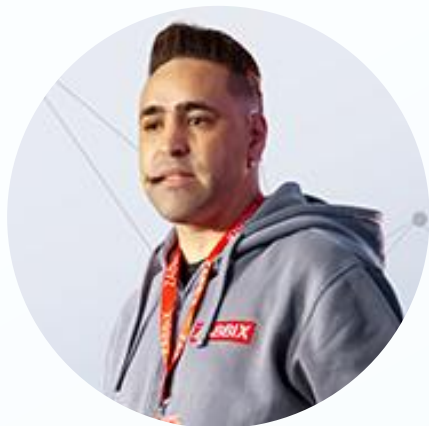
Zabbix in Action

Smart Monitoring with
Discovery, Correlation, and AI



Hernandes Martins

Zabbix Trainer
Lunio, Brazil



Hernandes Martins

- ▶ Professional with over 14 years of Zabbix experience
- ▶ Active in the Zabbix community, contributing to forums, social media, and community channels in Brazil and abroad
- ▶ Certifications:
 - Zabbix Trainer
 - Zabbix Expert
 - Zabbix Specialist
 - Zabbix Professional
- ▶ Observability Specialist Consultant at Lunio(**Zabbix Premium Partner**)



Lunio is a Brazilian company specializing in Observability, Cloud Computing, Cybersecurity, and Managed Services.

Created to enable our clients to leverage technology in favor of their business.

With over 12 years in the market, based in the Porto Digital Technology Hub in Recife (PE), Brazil.



Agenda

- About the project
- Challenges
- Zabbix features
- Integrations
- AI modules

About the project



This project was implemented for a major telecom service provider in São Paulo (Brazil), connecting over 200 cities with new acquisitions. The company needed to scale and modernize its monitoring operation, aiming for better network control, cost reduction, and improved operational efficiency.

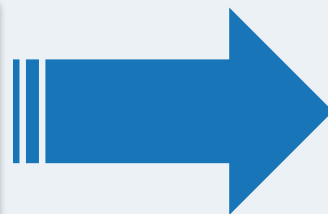
Challenges



Challenges

Migration

IBM
Netcool



ZABBIX



Challenges

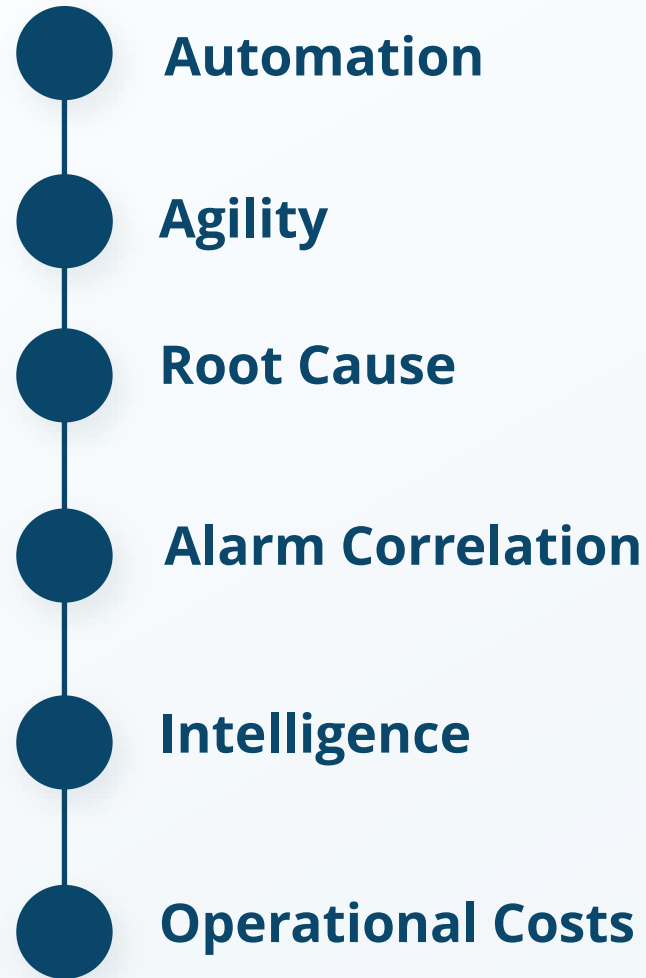
Migration



ZABBIX



- ✓ **Preserve business rules**
- ✓ **Ensure alarm enrichment**
- ✓ **Correlate events from GPON and Backbone networks**



IBM
Netcool

ZABBIX



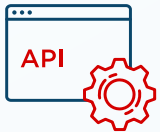
Project Scope



- ✓ Preserve business rules
- ✓ Ensure alarm enrichment
- ✓ Correlate events from GPON and Backbone networks



Using Network Discovery



CMDB Integration



Event Correlation



Business Rules (AS IS)



BMC Helix Integration
(Service Desk)



Data Processing

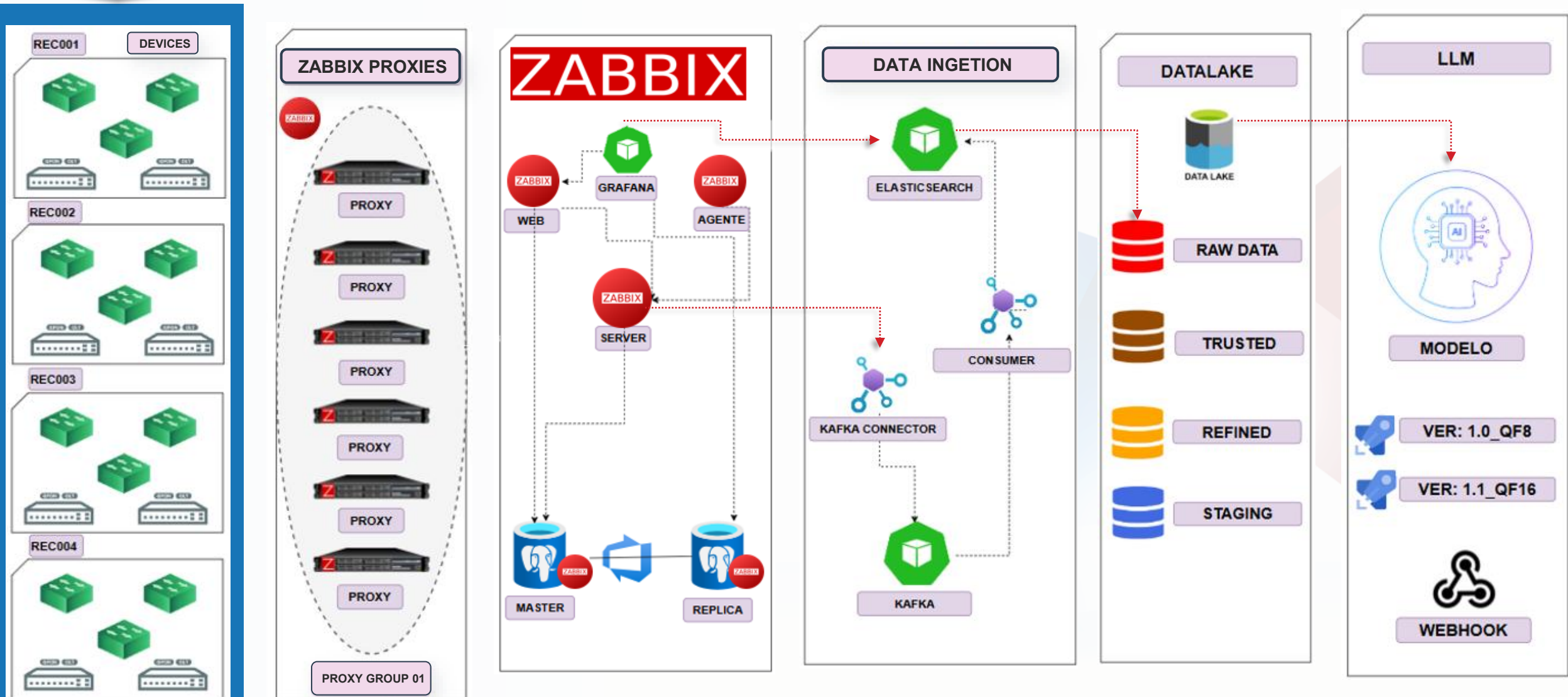


Ensuring Vision with Geolocation

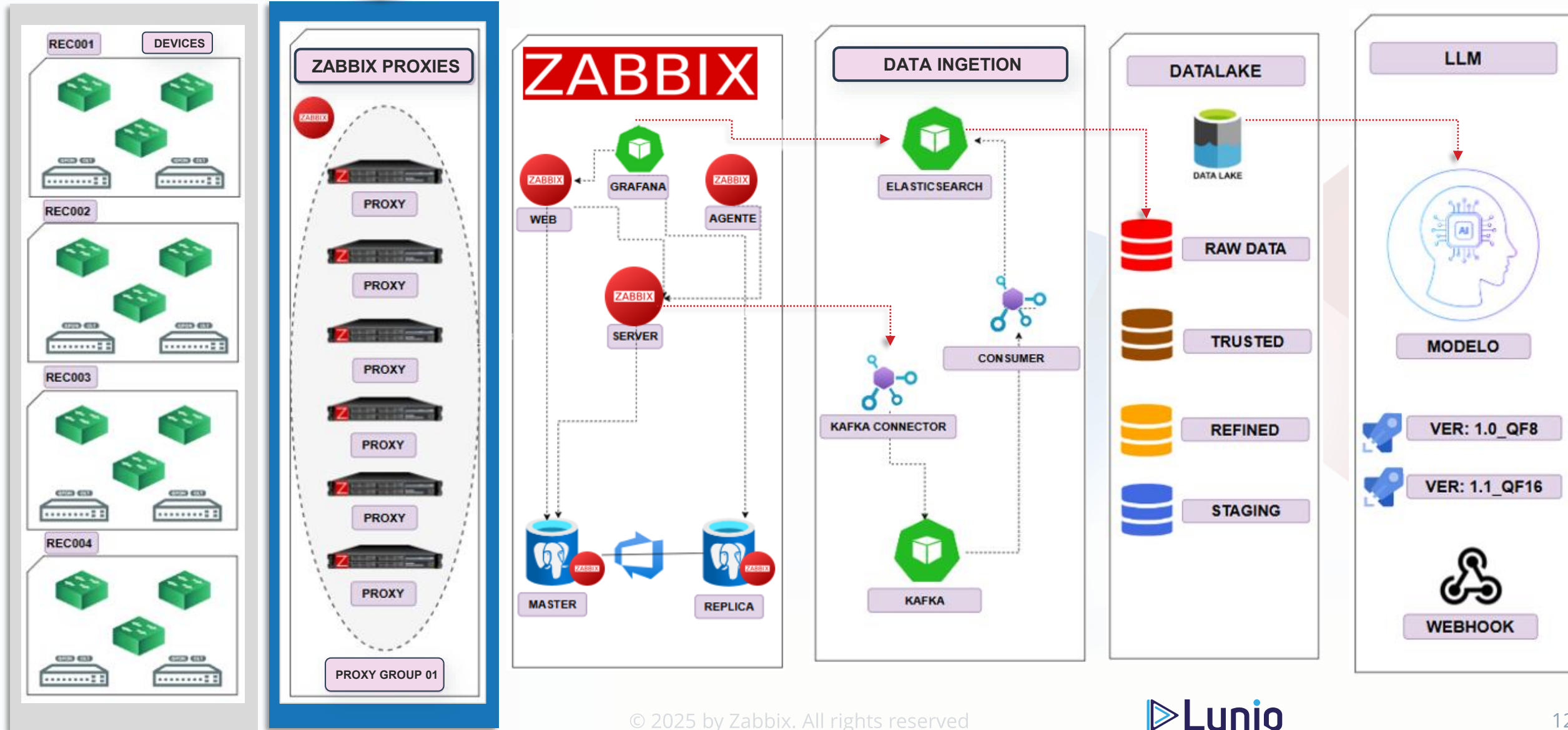


Using Artificial Intelligence Models

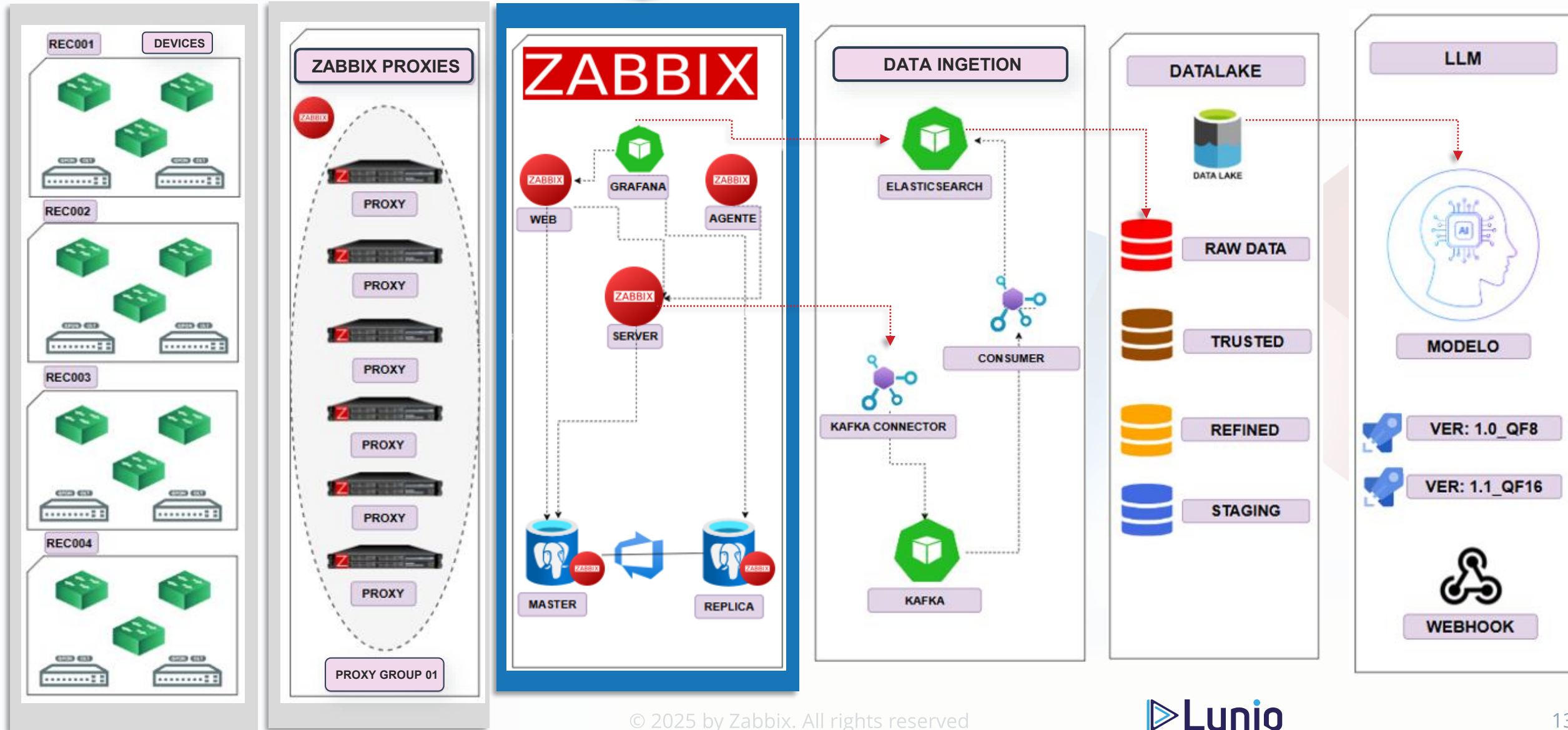
ARCHITECTURE



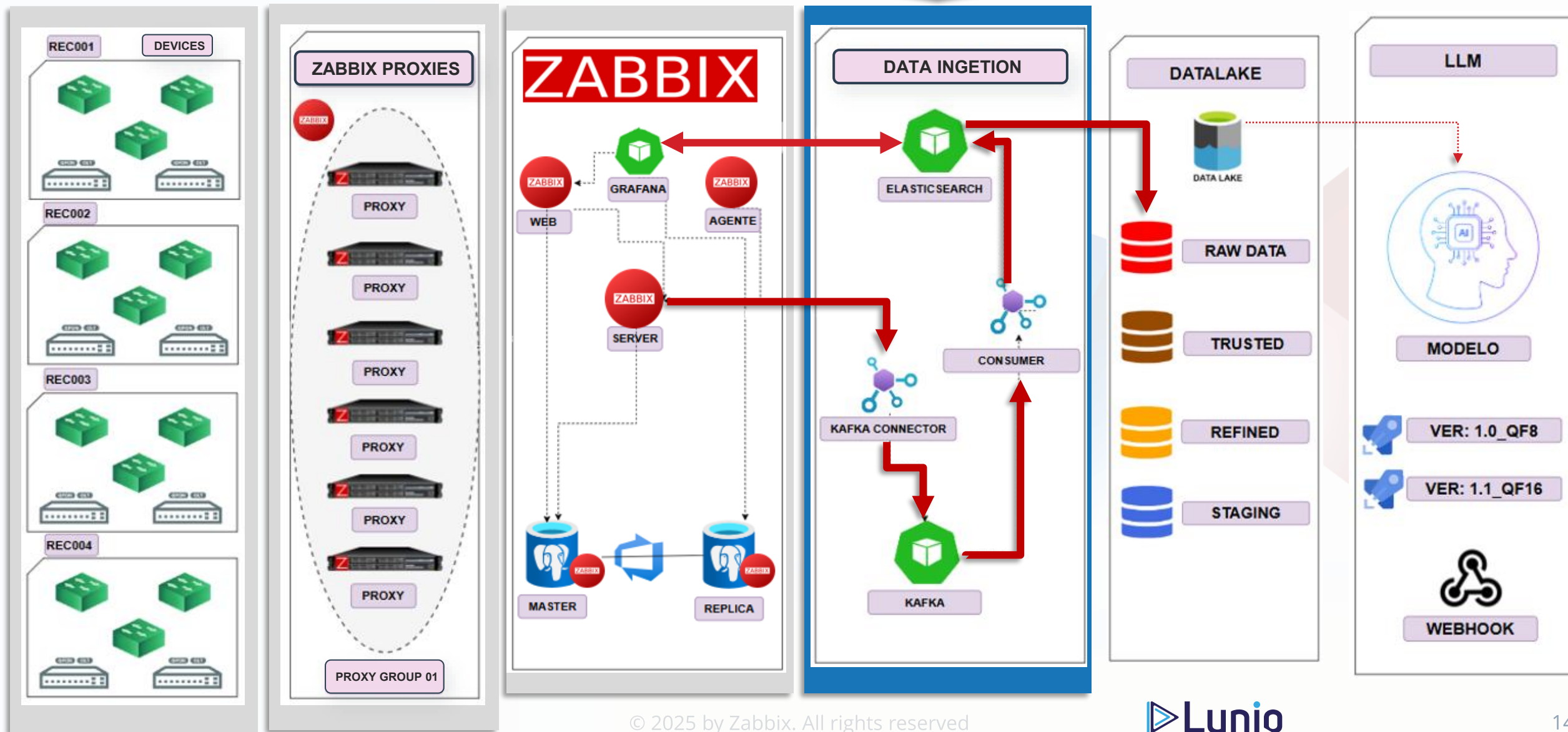
ARCHITECTURE



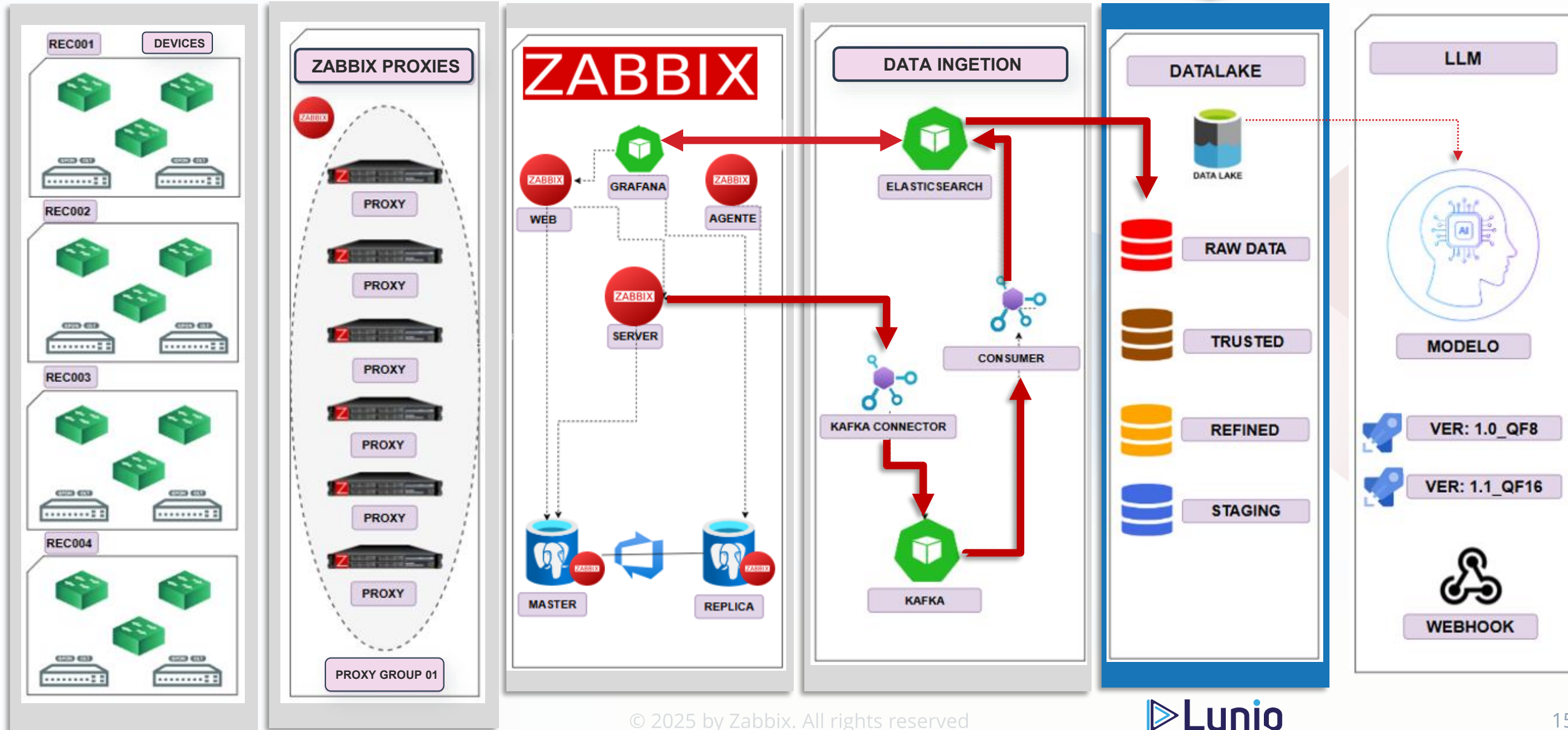
ARCHITECTURE



ARCHITECTURE

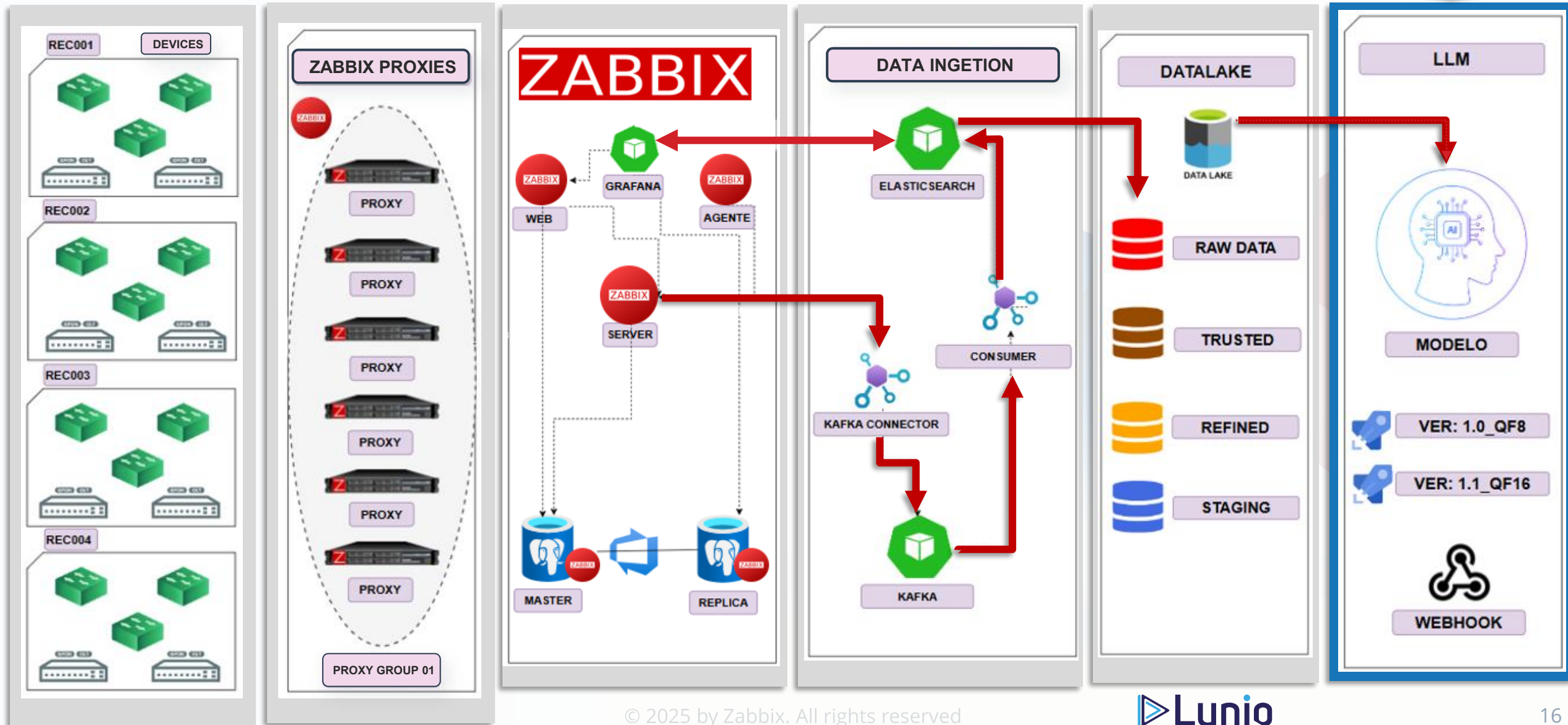


ARCHITECTURE

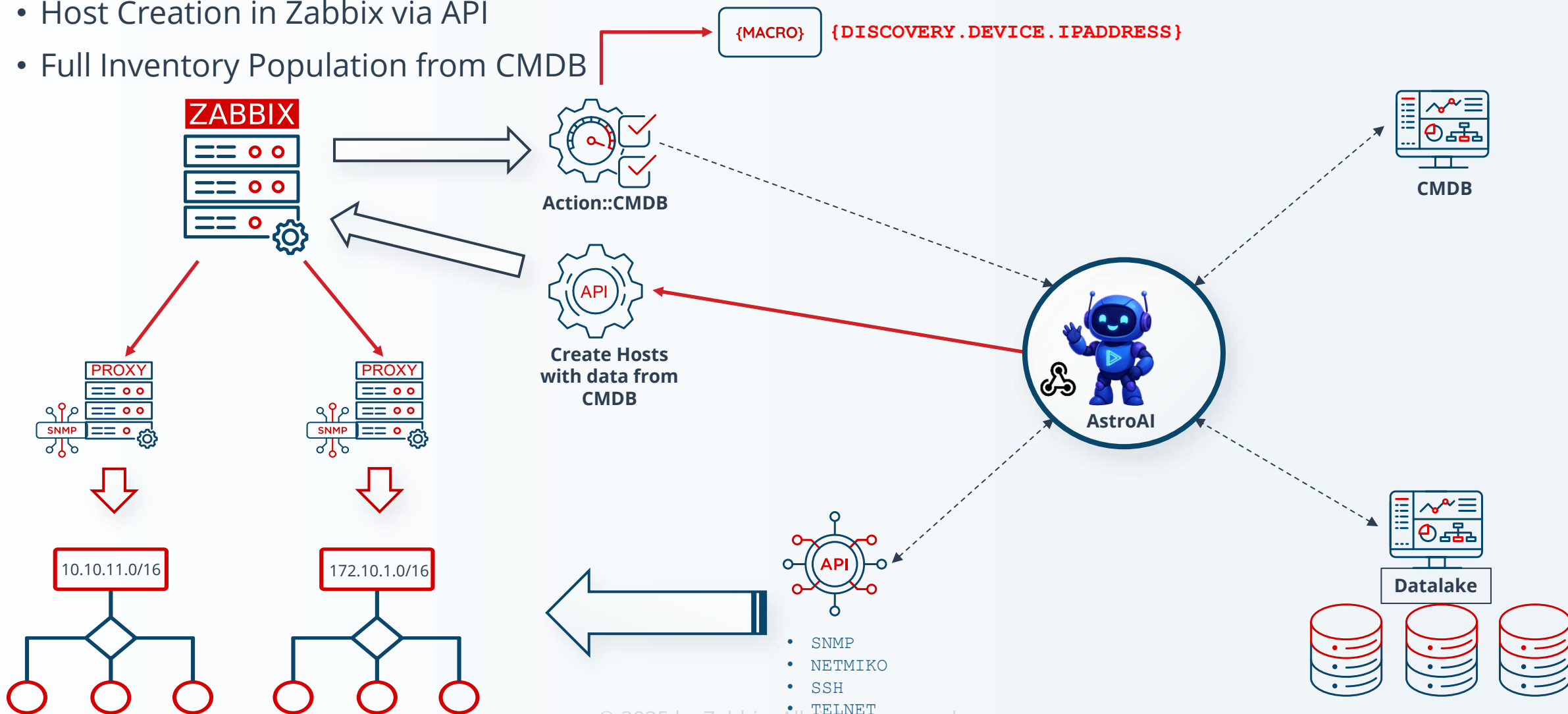


ARCHITECTURE

ZABBIX



Network Discovery



Network Discovery Rules

Discovery rule

* Name

Discovery Rede Overlay

Discovery by

Server

* IP range

10.0.2.1-2

* Update interval

1h

Maximum concurrent checks per type

One

* Checks

Type

ICMP ping

Maximum concurrent checks per type

One

Unlimited

Custom

10

Action

Operations 1

* Name

Integracao CMDB Webhook IA

Type of calculation

Or

A or (B or C)

Conditions

Label	Name	Action
A	Discovery rule equals <i>Discovery Rede Overlay</i>	Remove
B	Discovery status equals <i>Up</i>	Remove

Action

Operations 1

Operations

Details

Run script "Integra::CMDB" on hosts: Zabbix server

[Add](#)

At least one operation must exist.

Actions

[Edit](#)

[Remove](#)

Update

Clone

Delete

Cancel

Script CMDB Integration



```
# IP recebido da macro do Zabbix ou como argumento
DEVICE_IP="{DISCOVERY.DEVICE.IPADDRESS}"
```

- Hostgroup
- Hostname
- Community
- Template
- Tags
- Proxy_groupid

```
if
"monitored_by": 2,
"proxy_groupid": 1,
"inventory_mode": 0,
"inventory": {
"alias": ""$redetype"",
"asset_tag": ""$sla"",
"contract_number": ""$numero_contrato"",
"date_hw_expiry": ""$data_garantia"",
"date_hw_install": ""$data_instalacao"",
"hardware": ""$fabricante"",
"hardware_full": ""$versao_firmware"",
"host_netmask": ""$vlan_mgmt"",
"host_networks": ""$acl"",
"location_lat": ""$latitude"",
"location_lon": ""$longitude"",
"model": ""$modelo"",
"name": ""$hostname"",
"notes": ""$observacoes"",
"oob_ip": ""$ip_address"",
"oob_netmask": ""$mascara"",
"oob_router": ""$gateway"",
"poc_l_name": ""$responsavel_local"",
"serialno_a": ""$numero_serie"",
"site_address_a": ""$endereco_completo"",
"site_address_b": ""$numero"",
"site_address_c": ""$bairro"",
"site_city": ""$cidade"",
"site_notes": ""$regiao"",
"site_rack": ""$site"",
"site_state": ""$estado"",
"site_zip": ""$cep"",
"tag": ""$tag_patrimonio"",
"type": ""$tipo"",
"type_full": ""$tipo_placa"",
"vendor": ""$fornecedor"",
"deployment_status": "Ativo",
"site_country": "Brasil"
```

Name	Items	Triggers	Graphs	Discovery	Web	Interface	Proxy	Templates	Status	Availability	Agent encryption	Info	Tags
<input type="checkbox"/> olt_rec001-gp01-pe	Items 74	Triggers 23	Graphs	Discovery 2	Web	olt_rec001-gp01-pe161	Zabbix_roxy_group: Zabbix_proxy_02	[V.1.0] - Template OLT Huawei (Generic by SNMP)	Enabled	SNMP	None	cidade: Recife	site: REC001 tipo: gpon
<input type="checkbox"/> olt_rec002-gp01-pe	Items 50	Triggers 15	Graphs	Discovery 2	Web	olt_rec002-gp01-pe161	Zabbix_roxy_group: Zabbix_proxy_01	[V.1.0] - Template OLT Huawei (Generic by SNMP)	Enabled	SNMP	None	cidade: Recife	site: REC002 tipo: gpon
<input type="checkbox"/> olt_rec003-gp01-pe	Items 50	Triggers 15	Graphs	Discovery 2	Web	olt_rec003-gp01-pe161	Zabbix_roxy_group: Zabbix_proxy_01	[V.1.0] - Template OLT Huawei (Generic by SNMP)	Enabled	SNMP	None	cidade: Recife	site: REC003 tipo: gpon
<input type="checkbox"/> olt_rec004-gp01-pe	Items 50	Triggers 15	Graphs	Discovery 2	Web	olt_rec004-gp01-pe161	Zabbix_roxy_group: Zabbix_proxy_01	[V.1.0] - Template OLT Huawei (Generic by SNMP)	Enabled	SNMP	None	cidade: Recife	site: REC004 tipo: gpon
<input type="checkbox"/> olt_rec005-gp01-pe	Items 50	Triggers 15	Graphs	Discovery 2	Web	olt_rec005-gp01-pe161	Zabbix_roxy_group: Zabbix_proxy_02	[V.1.0] - Template OLT Huawei (Generic by SNMP)	Enabled	SNMP	None	cidade: Recife	site: REC005 tipo: gpon
<input type="checkbox"/> sw_rec001-bk01-pe	Items 94	Triggers 15	Graphs 9	Discovery 1	Web	sw_rec001-bk01-pe161	Zabbix_roxy_group: Zabbix_proxy_01	[V.1.0] - Template SW Huawei (Generic by SNMP)	Enabled	SNMP	None	cidade: Recife	site: REC001 tipo: backbone
<input type="checkbox"/> sw_rec002-bk01-pe	Items 67	Triggers 12	Graphs 6	Discovery 1	Web	sw_rec002-bk01-pe161	Zabbix_roxy_group: Zabbix_proxy_01	[V.1.0] - Template SW Huawei (Generic by SNMP)	Enabled	SNMP	None	cidade: Recife	site: REC002 tipo: backbone
<input type="checkbox"/> sw_rec003-bk01-pe	Items 67	Triggers 12	Graphs 6	Discovery 1	Web	sw_rec003-bk01-pe161	Zabbix_roxy_group: Zabbix_proxy_02	[V.1.0] - Template SW Huawei (Generic by SNMP)	Enabled	SNMP	None	cidade: Recife	site: REC003 tipo: backbone
<input type="checkbox"/> sw_rec004-bk01-pe	Items 94	Triggers 15	Graphs 9	Discovery 1	Web	sw_rec004-bk01-pe161	Zabbix_roxy_group: Zabbix_proxy_02	[V.1.0] - Template SW Huawei (Generic by SNMP)	Enabled	SNMP	None	cidade: Recife	site: REC004 tipo: backbone
<input type="checkbox"/> sw_rec005-bk01-pe	Items 67	Triggers 12	Graphs 6	Discovery 1	Web	sw_rec005-bk01-pe161	Zabbix_roxy_group: Zabbix_proxy_02	[V.1.0] - Template SW Huawei (Generic by SNMP)	Enabled	SNMP	None	cidade: Recife	site: REC005 tipo: backbone
<input type="checkbox"/> Zabbix server	Items 106	Triggers 105	Graphs 16	Discovery 6	Web	zabbix_agent.10050		Linux by Zabbix agent, Zabbix server health	Enabled	ZBX	None		

Host inventory

OverviewDetails

Type OLT

Type (Full details) GPON

Name olt_rec004-gp01-pe

Alias gpon

Serial number A SN-HW-191231TUVW3456

Tag PAT-2021-030

Asset tag 8x5 (Next Business Day)

Hardware Huawei

Hardware (Full details) V800R020C20

Location latitude -8.06352

Location longitude -34.944704

Notes Equipamento em fase de descomissionamento

Model MA5683T

Vendor Telecom RS

Contract number CT-2021-050

Deployment status Ativo

Host networks 192.168.10.0/24

Host subnet mask 300

OOB IP address 10.0.2.75

OOB subnet mask 255.255.255.0

OOB router 10.0.2.1

Date HW installed 2020-08-05 00:00:00

Date HW maintenance expires 2023-08-05 00:00:00

Site address A BR-101

Site address B 1668

Site address C Curado

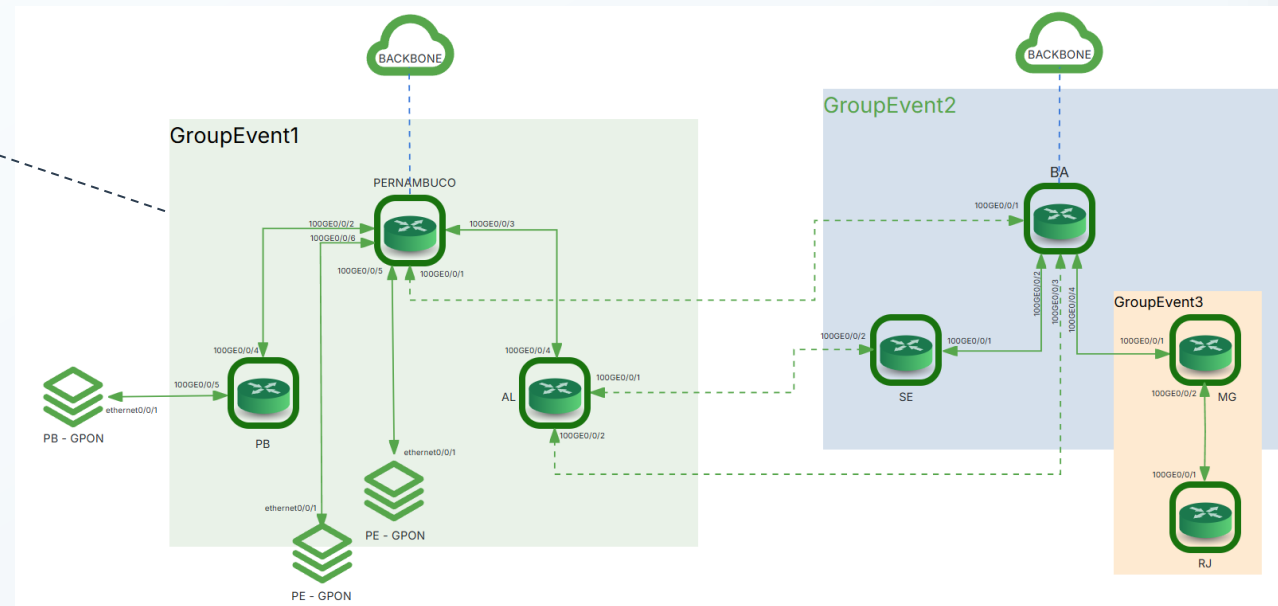
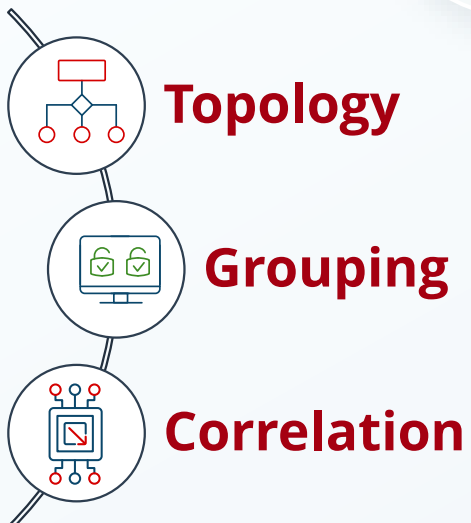
Site city Recife

EVENT CORRELATION

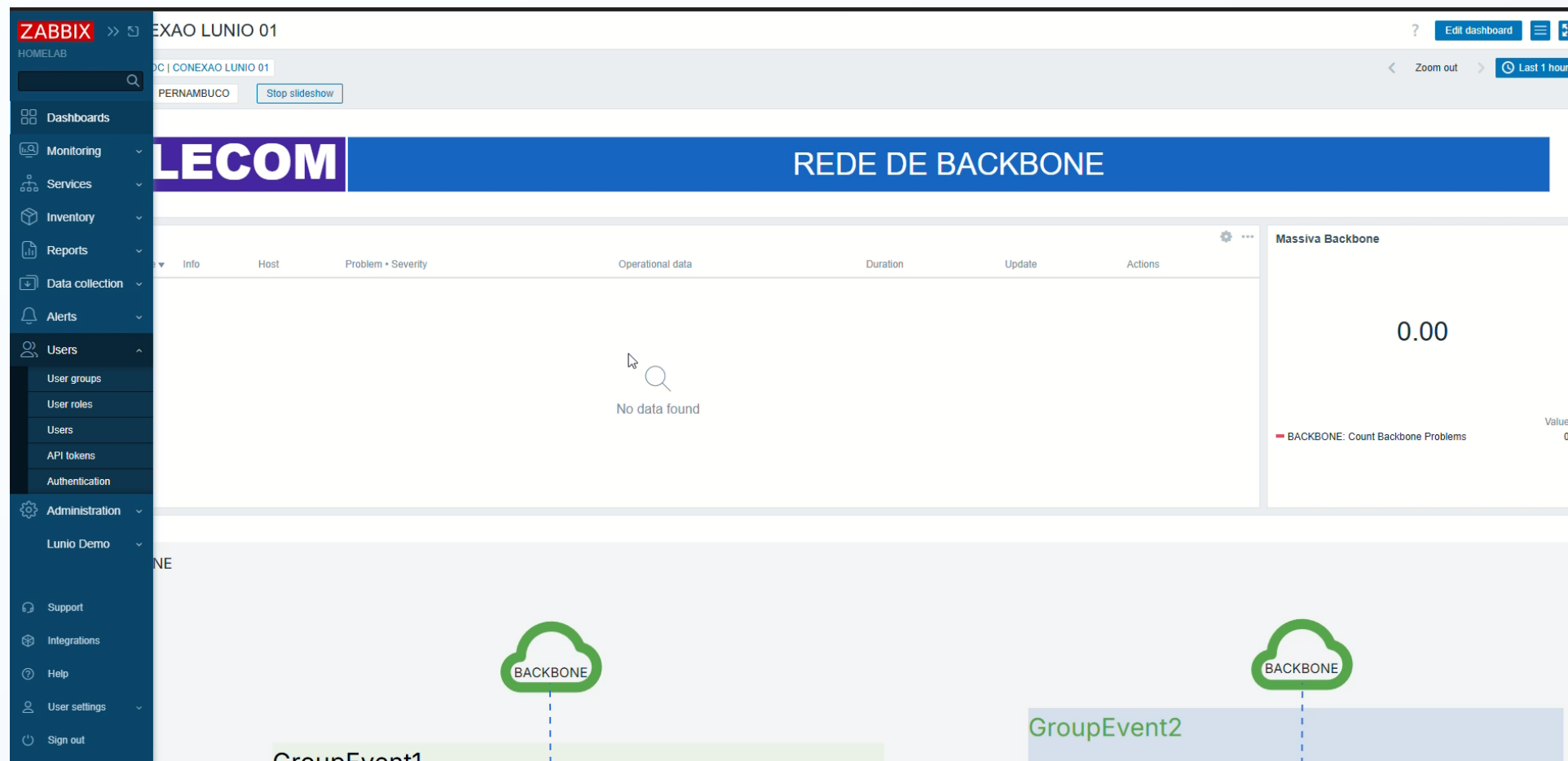


Template Alarm Correlation *(Parent and Child Events)*

- ▶ Zabbix Template for Large-Scale Event Correlation
- ▶ Automatic Grouping of Incidents in Massive Events
- ▶ Optimization of Failure Analysis and Operational Response



Alarm Correlation (*Parent and Child Events*)



Alarm Correlation (*Parent and Child Events*)

☐ Name ▲

Hosts	Items	Triggers	Graphs	Dashboards	Discovery	Web	
[AstroAI V.1.16] - Template Correlation Backbone	Hosts 6	Items 2	Triggers 1	Graphs	Dashboards	Discovery	Web

Item

Item

Tags

Preprocessing 4

* Name

AstroAI: Backbone

Type

Script

* Key

e.analysis.backbone

Select

Type of information

Text

Parameters

Name	Value	
hostName	{HOST.NAME}	Remove
token	76a4	Remove
url	onrpi	Remove
Add		

* Script

try {...

* Update interval

1m

Custom intervals

Type	Interval	Period	
Flexible	Scheduling	50s	1-7,00:00-24:00 Remove
Add			

* Timeout

Global

Override

3s

Timeouts

* History

Do not store

Store up to

31d

Populates host inventory field

-None-

Description

JavaScript

```

142
143
144
145 // Formatar o resultado final com apenas os EventIds do host dominante com o maior EventGroup
146 var result;
147 if (largestGroupHost) {
148     uniqueEventIds = eventGroups[largestGroupHost].reduce(function(acc, eventId) {
149         if (acc.indexOf(eventId) === -1) {
150             acc.push(eventId);
151         }
152         return acc;
153     }, []);
154
155     Zabbix.log(3, 'Zabbix BACKBONE script uniqueEventIds: ' + JSON.stringify(uniqueEventIds));
156
157     result = uniqueEventIds.join(',');
158 } else {
159     Zabbix.log(3, 'Zabbix BACKBONE script result: No dominant host found' );
160     result = '0';
161 }
162
163 // Verificar se o host.name do evento está no nome do host.name do host dominante
164 if (params.hostName !== largestGroupHost) {
165     Zabbix.log(3, 'Zabbix BACKBONE script result: params.hostName - ' + params.hostName + ' !== eventGroups[largestGroupHost]');
166     result = '0';
167 } else {
168     // eventGroups[largestGroupHost].push(params.eventid);
169     // result = eventGroups[largestGroupHost].join(',');
170 }
171
172 Zabbix.log(3, 'Zabbix BACKBONE script result: ' + JSON.stringify(result));
173
174 } catch (error) {
175     Zabbix.log(3, 'Zabbix BACKBONE script falhou: ' + error);
176     var result = error;
177 }
178
179 return JSON.stringify(result);
                    
```

59024 characters remaining

Apply

Cancel

AIOPs Module

AstroAI

Problema: Interface is unavailable: 100GE0/0/4 (SW-M01-REC001-PE;backbone;100GE0/0/3)

Host: SW-M01-MAC001-AL

Trigger: Interface is unavailable: 100GE0/0/4 (SW-M01-REC001-PE;backbone;100GE0/0/3)

Mensagem: ### Incidentes Ativos Relacionados

1. **Indisponibilidade do Backbone**

- **Host:** SW-M01-REC001-PE

- **Severidade:** 5

- **Descrição:** Indisponibilidade de múltiplos recursos de backbone, afetando a conectividade entre dispositivos.

2. **Interface Indisponível: 100GE0/0/4**

- **Host:** SW-M01-MAC001-AL

- **Severidade:** 3

- **Descrição:** Interface 100GE0/0/4 está indisponível, possivelmente conectada a um recurso do backbone.

3. **Interface Indisponível: 100GE0/0/3**

- **Host:** SW-M01-REC001-PE

- **Severidade:** 3

- **Descrição:** Interface 100GE0/0/3 está indisponível, que serve como entrada/saída do backbone.

4. **Interface Indisponível: 100GE0/0/1**

- **Host:** SW-M01-REC001-PE

- **Severidade:** 3

- **Descrição:** Outra interface crítica que está indisponível.

5. **Interface Indisponível: 100GE0/0/2**

- **Host:** SW-M01-JPA001-PB

Fechar

ZABBIX
+
KAFKA & ELASTICSEARCH

Zabbix streaming to external systems

ZABBIX

APACHE
kafka

elasticsearch

- ▶ Real-time Integration between Kafka and Zabbix
- ▶ Distributed Processing and Real-Time Analysis
- ▶ Interoperability with External Systems and Enhanced Observability



Kafka Connector for Zabbix server

<https://git.zabbix.com/projects/ZT/repos/kafka-connector/browse>

- Kafka Connector for Zabbix
- Real-time Data Forwarding
- Optimization of Integrations for Distributed Processing

Item Values

Connector configuration for Item Values:

- Name: StreamIA_Kafka_Events
- Protocol: Zabbix Streaming Protocol v1.0
- Data type: Item values (selected), Events
- URL: http://kafka_kafka-connector/api/v1/events
- Tag filter: And/Or Or
- stream Equals kafka
- HTTP authentication: None
- Description: Envio de coletas de itens para o kafka
- Enabled: ☒

Events

Connector configuration for Events:

- Name: StreamIA_Kafka_Items
- Protocol: Zabbix Streaming Protocol v1.0
- Data type: Item values, Events (selected)
- URL: http://kafka_kafka-connector/api/v1/items
- Tag filter: And/Or Or
- stream Equals kafka
- Type of information: ☒ Numeric (unsigned), ☒ Character, ☒ Text, ☒ Numeric (float), ☒ Log, ☐ Binary
- HTTP authentication: None
- Description: Envio de coletas de itens para o kafka
- Enabled: ☒

Messages: Items

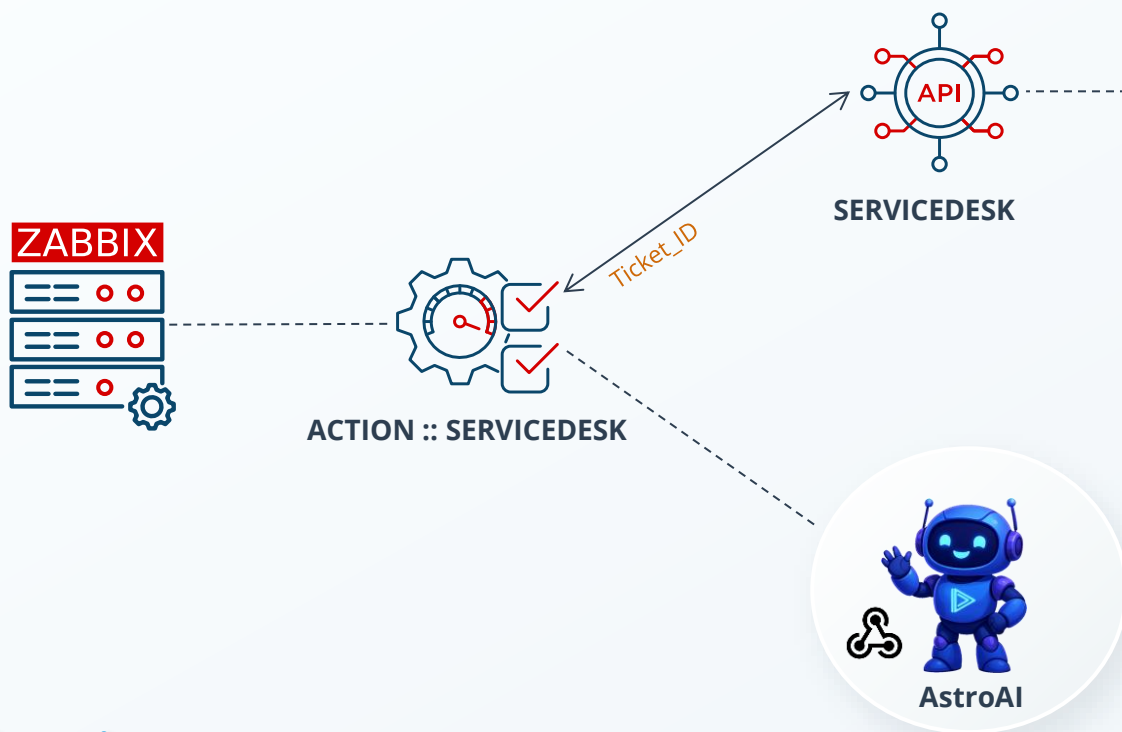
```
Offset: 2309743 Key: 57521 Timestamp: 2025-05-08 09:49:13.807 Headers: empty
{
  "clock": 1746697751,
  "groups": [
    "REC002"
  ],
  "host": {
    "host": "sw_rec002-bk01-pe",
    "name": "sw_rec002-bk01-pe"
  },
  "item_tags": [
    {
      "tag": "component",
      "value": "network"
    },
    {
      "tag": "stream",
      "value": "kafka"
    }
  ],
  "itemid": 57521,
  "name": "100GE0/2/1 :: sw_rec003-bk01-pe;100GE0/2/10;backbone;40G;40000000000;Eth-Trunk3 :: Speed",
  "ns": 727526574,
  "type": 3,
  "value": 10000000000
}
```

INTEGRATIONS

ServiceDesk (BMC HELIX)

Intelligent Root Cause Analysis

Ticket Opening in ServiceDesk with Intelligent Root Cause Analysis.



Incident Analysis:

Device: sw_rec001-bk01-pe
Interface: 100GE0/2/11
Status: Down (0)

Possible Causes:

Physical cabling failure: Check for issues with optical or metallic cabling.

Accidental disconnection: Verify if the cable was unplugged or if there is a connector fault.

Manually disabled port: It may have been disabled via command or due to configuration error.

Equipment problems: Possible hardware failure on the switch's physical interface.

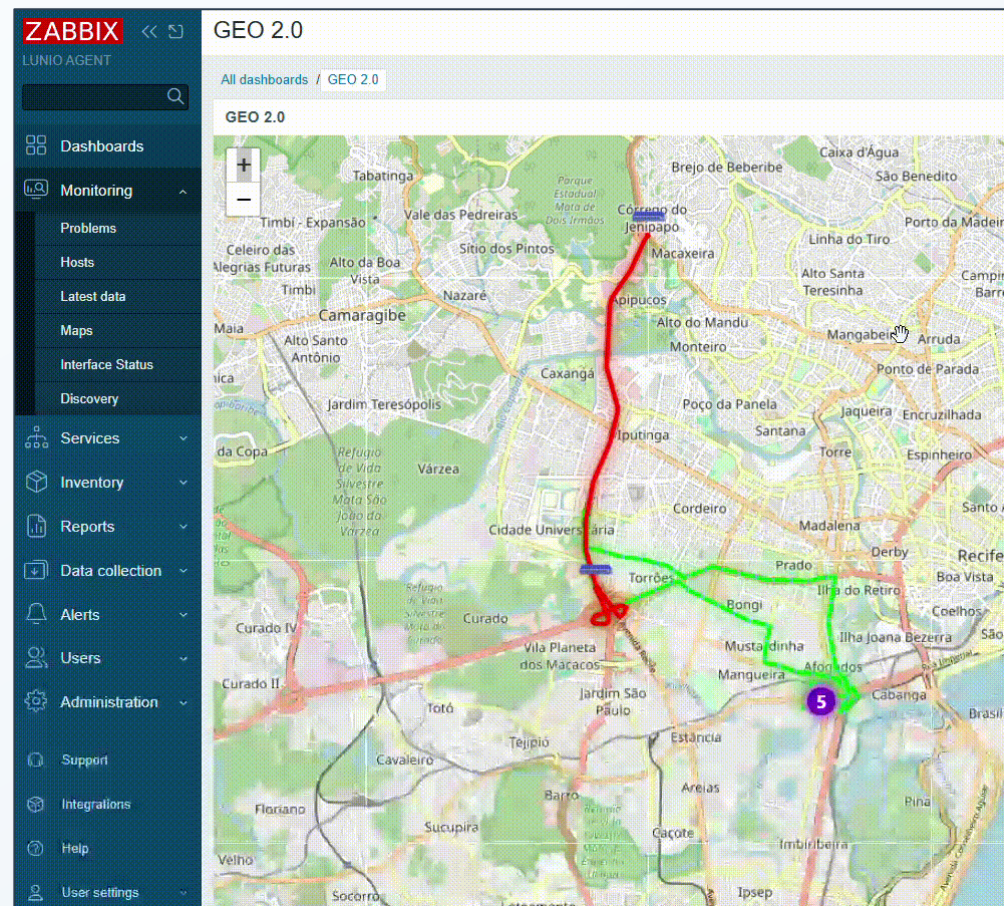
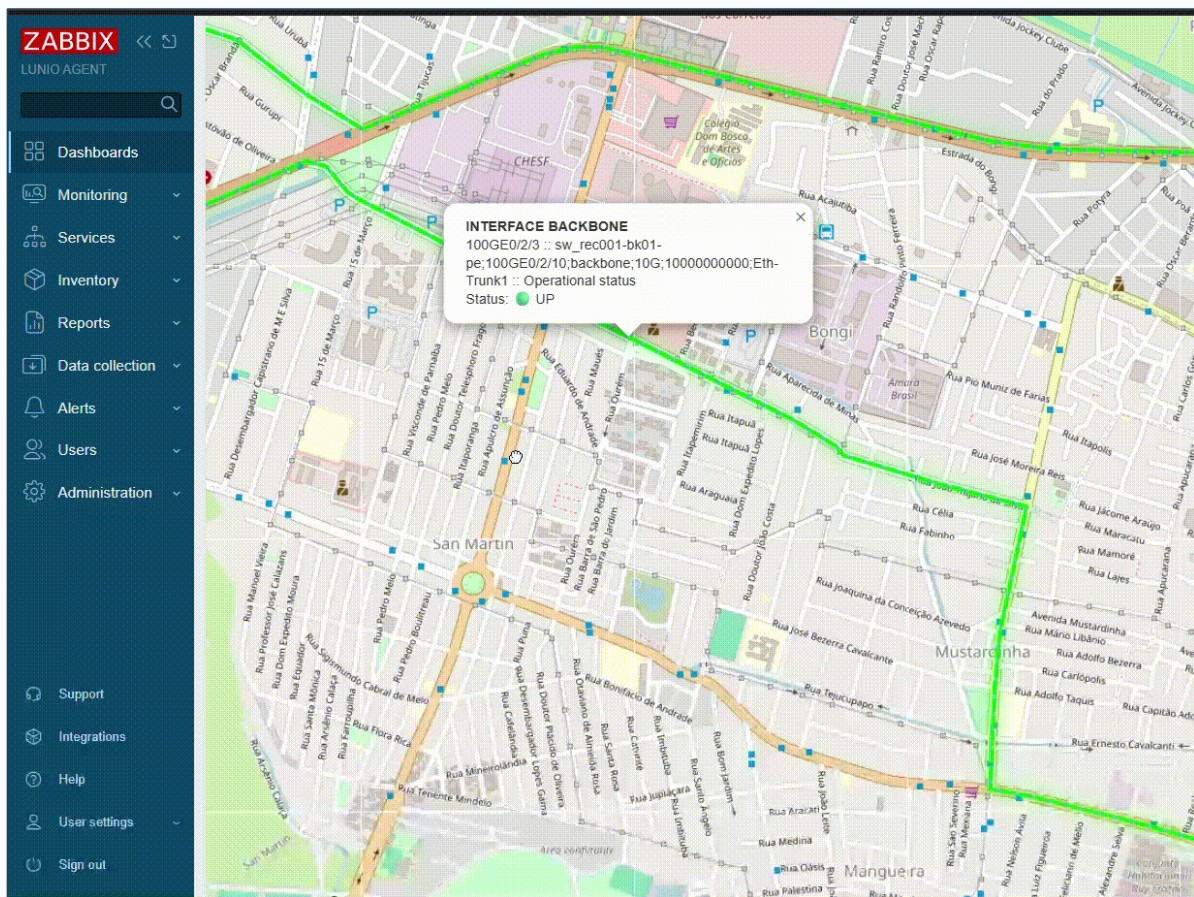
Loop detected: Some switches disable ports when loops are detected on the network.

Negotiation issues: Speed or duplex mismatch between connected devices.

More details...

GEOLOCATION

GEOLOCATION



DATA INTELLIGENCE

Going beyond discovery

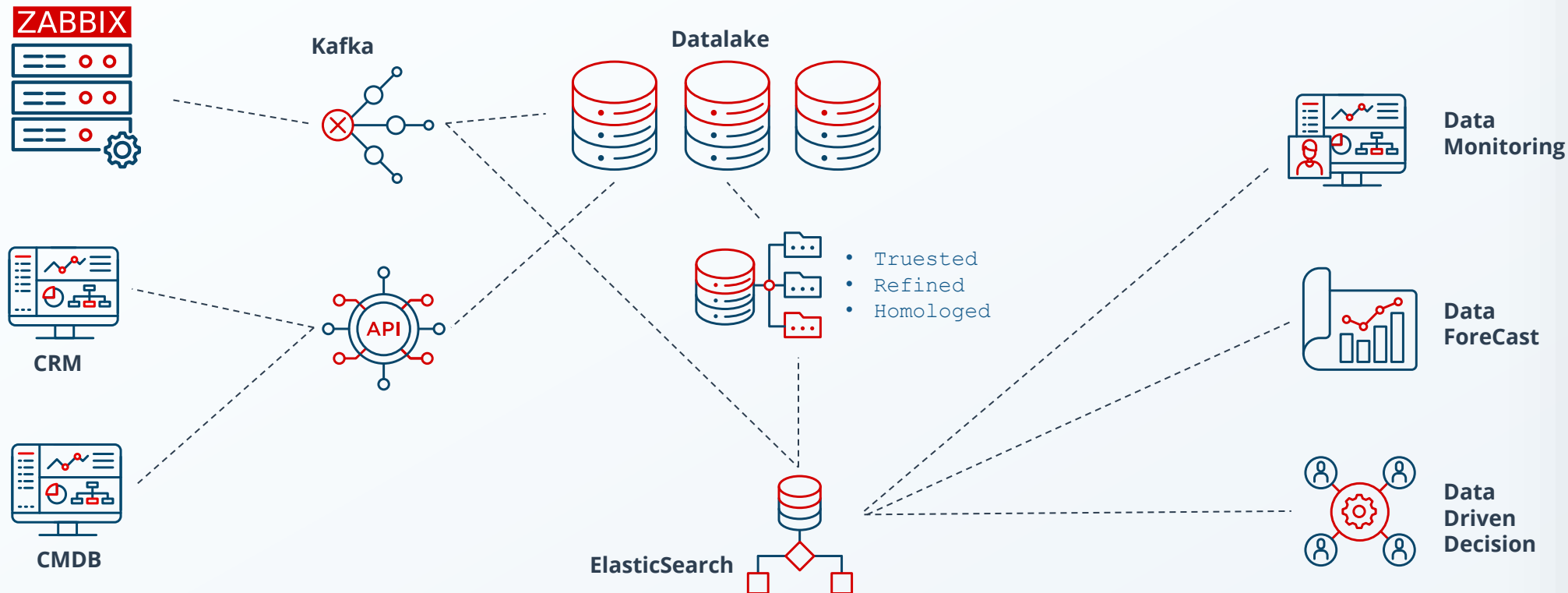


Data Intelligence

Because collecting isn't enough — it's necessary to connect and transform.

Data without context is just noise.

Our data strategy goes beyond simple information gathering, establishing a complete journey from the discovery of new devices to the generation of valuable insights that support critical decisions.

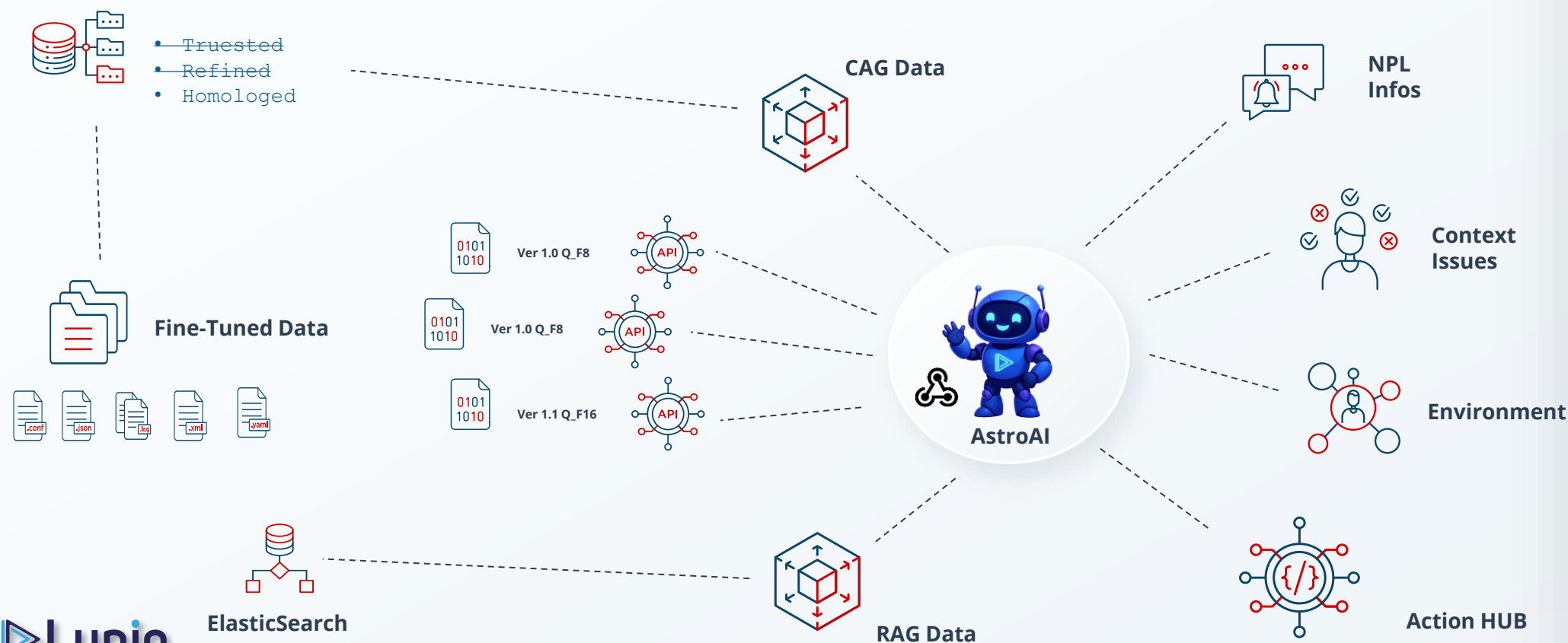


Artificial Intelligence in Operational Management



Artificial Intelligence in Operation

With Zabbix and AI it is easier to transform raw data into strategic decisions.



Advanced Nvidia GPU Monitoring for High Performance



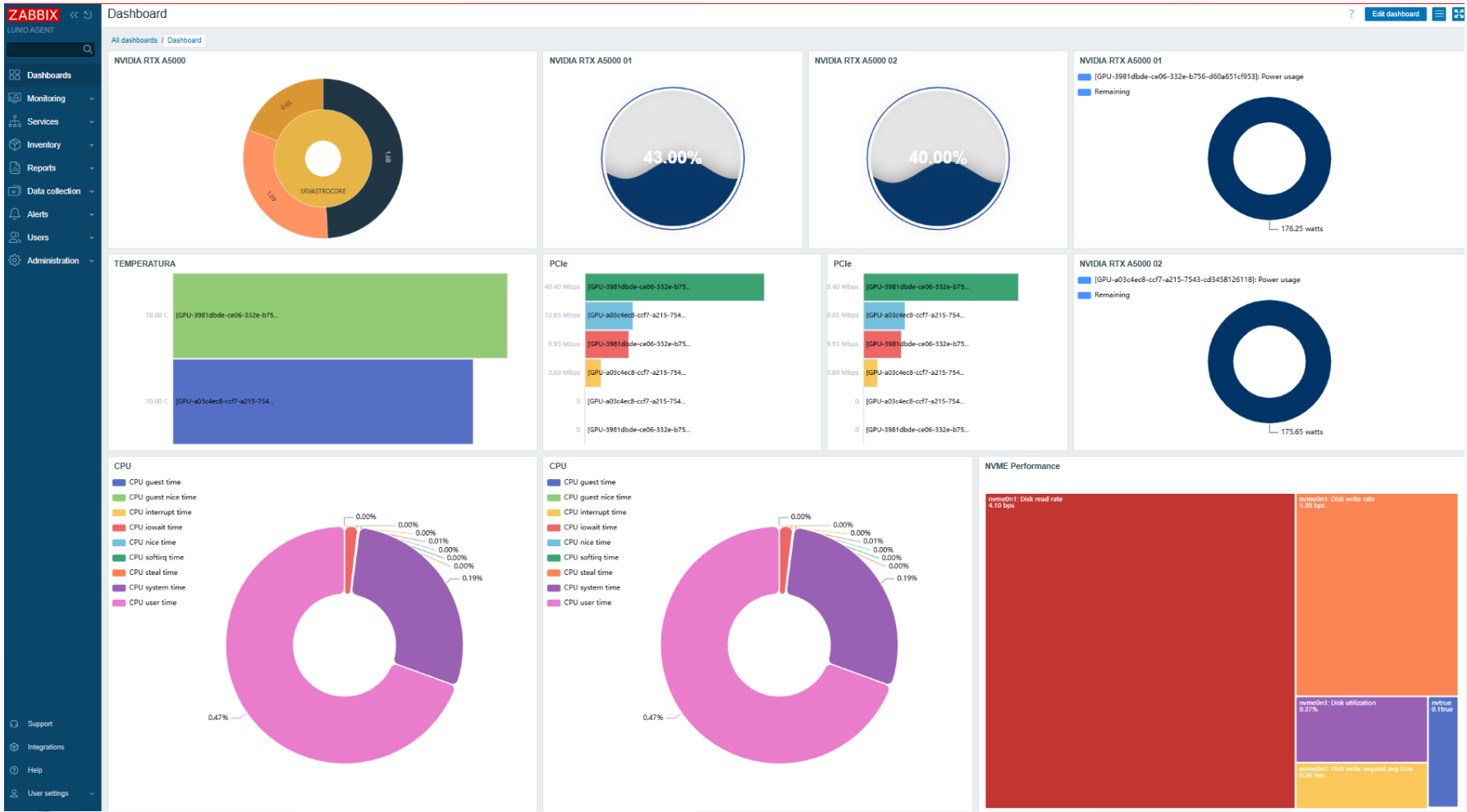
NVIDIA RTX A5000

```
(base) root@server:/home/server# nvidia-smi
Mon May 19 14:21:47 2025

+-----+
| NVIDIA-SMI 550.144.03                 Driver Version: 550.144.03   CUDA Version: 12.4   |
+-----+-----+
| GPU  Name           Persistence-M | Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp    Perf       Pwr:Usage/Cap |      Memory-Usage | GPU-Util  Compute M. |
|====+=====+|
|  0  NVIDIA RTX A5000         Off   | 00000000:41:00.0 Off  |          0%      Default |
| 30%   33C    P8              19W / 230W | 15254MiB / 24564MiB |              MIG M. |
+-----+-----+
|  1  NVIDIA RTX A5000         Off   | 00000000:C1:00.0 Off  |          0%      Default |
| 30%   30C    P8              18W / 230W | 15030MiB / 24564MiB |              MIG M. |
+-----+-----+

+-----+
| Processes: |
| GPU   GI    CI          PID    Type   Process name                      GPU Memory |
|      ID     ID              |              | Usage     |
+-----+-----+
|  0     N/A   N/A         9089      C   python3                          7500MiB |
|  0     N/A   N/A         9706      C   /root/miniconda3/bin/python3      7744MiB |
|  1     N/A   N/A         9089      C   python3                          7174MiB |
|  1     N/A   N/A         9706      C   /root/miniconda3/bin/python3      7846MiB |
+-----+-----+
```

NVIDIA RTX A5000



BENEFITS AND ADVANTAGES

- ▶ Avoid over **700,000** support contacts
- ▶ Reduced licensing costs with IBM Netcool
- ▶ Increased customer satisfaction (NPS)
- ▶ Optimization of technical teams
- ▶ Scalability without additional costs
- ▶ Innovation and competitiveness
- ▶ Strategic analysis and planning

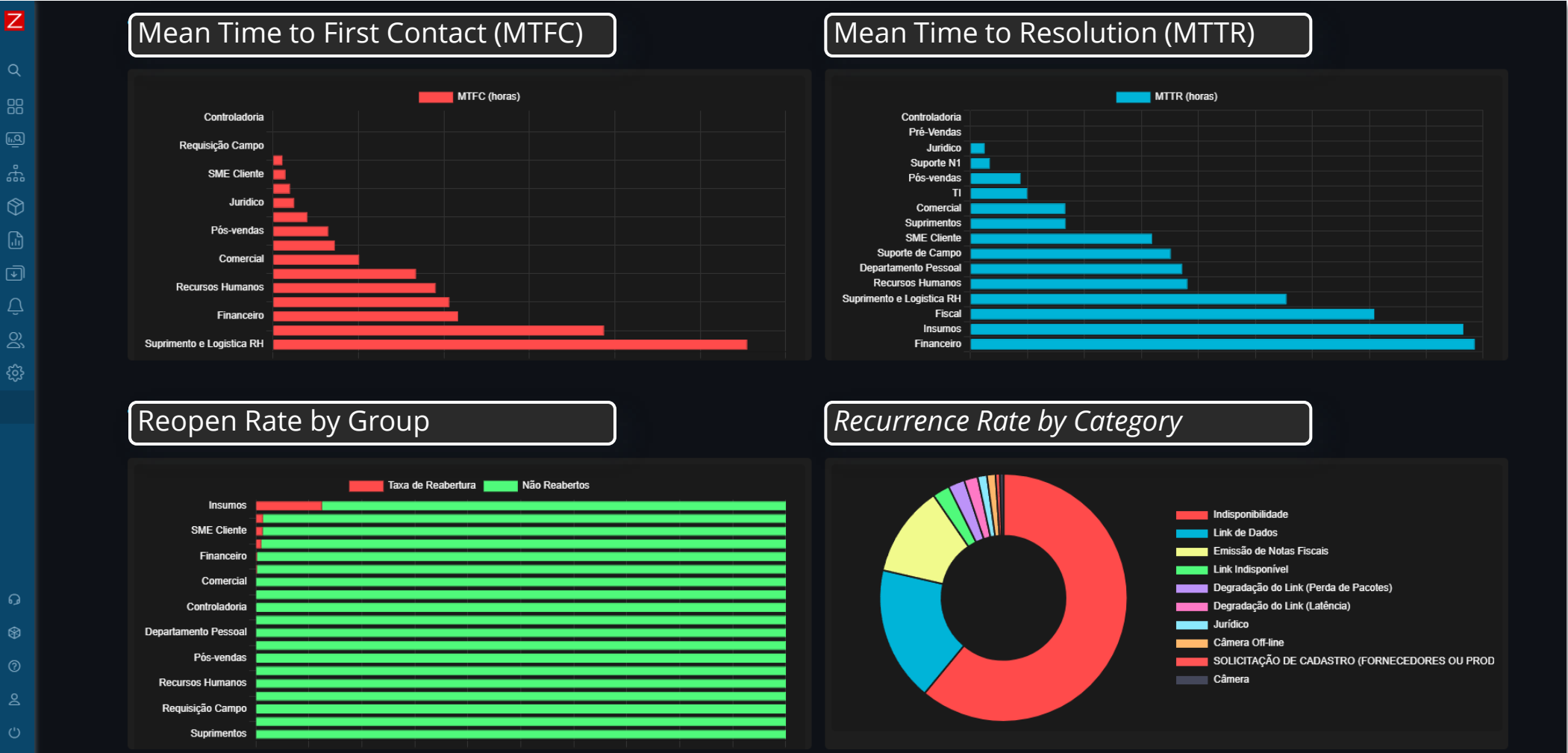
Cost Reduction Simulation

- ▶ Cost Components
 - ✓ Travel
 - ✓ Labor
 - ✓ Equipment and Tools
 - ✓ Response Time

ZABBIX

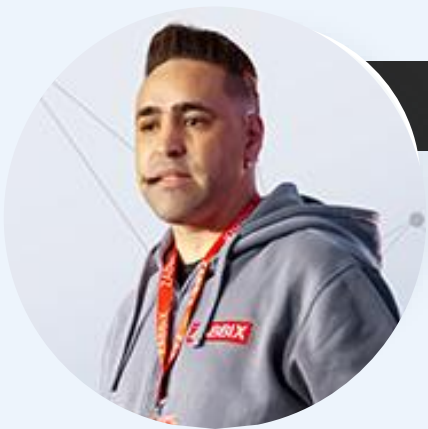
\$ 35.000.000/YEAR

Business Indicators (KPIs)





Thank you!



Hernandes Martins

Zabbix Trainer
Lunio, Brazil