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Nested LLD

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O que é LLD

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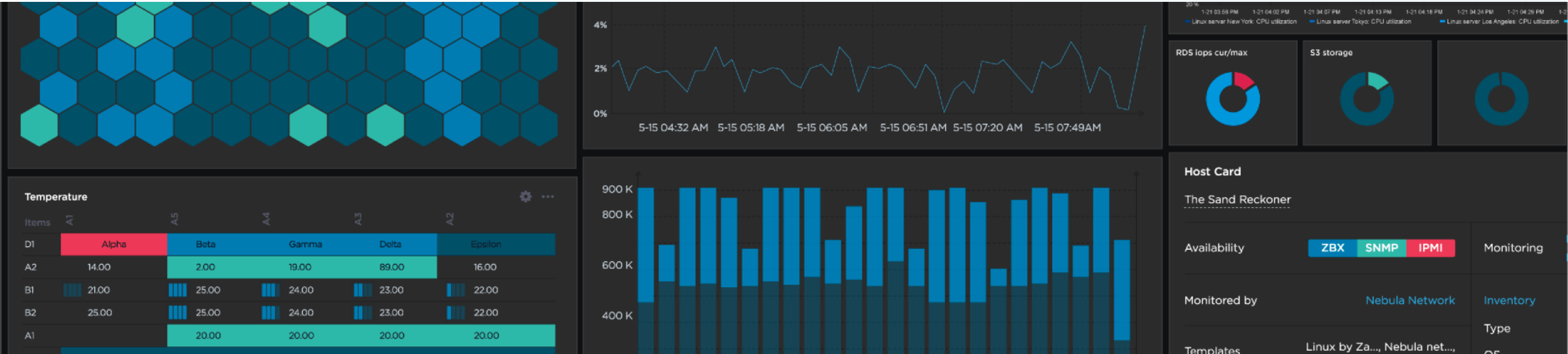

Low-level Discovery rule

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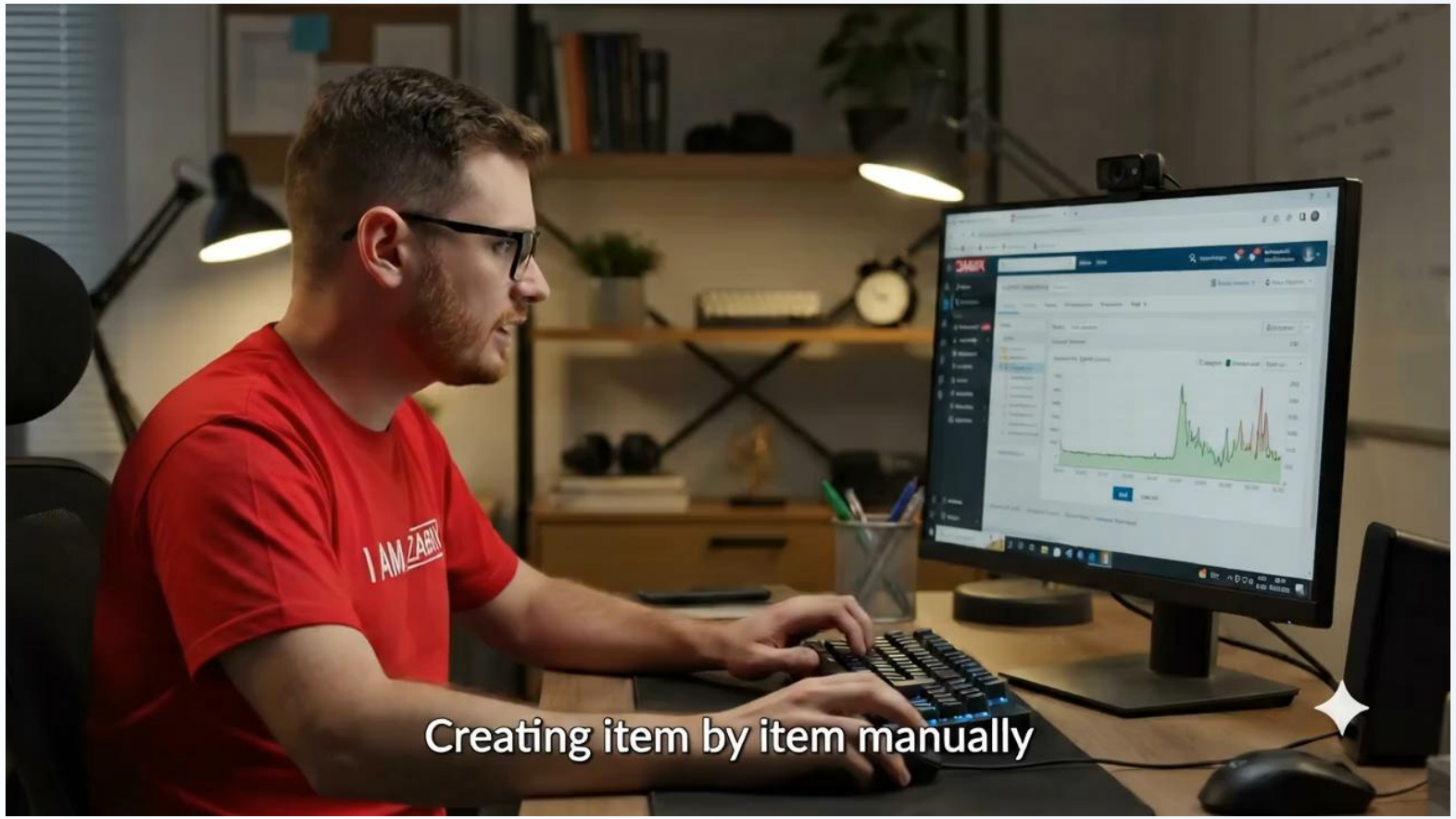
Em resumo:

- Descoberta automática de recursos (entidades ou hosts)
- Geração dinâmica baseada em dados JSON
- Uso de macros de descoberta nos protótipos
- Disponível desde o Zabbix 2.0

Por que usar LLD



Por que usar LLD

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Em resumo:

- Economiza tempo na criação de entidades
- Mantém padronização no monitoramento
- Reduz (e muito) o esforço operacional
- Facilita ambientes dinâmicos e escaláveis

Formato da LLD

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A regra de descoberta é responsável por ler um texto em JSON e através dele criar entidades através de protótipos.

- Itens
- Triggers
- Gráficos
- Hosts

Host	Name ▲	Items	Triggers	Graphs	Hosts
Zabbix server	Linux by Zabbix agent: Block devices discovery	Item prototypes 9	Trigger prototypes 1	Graph prototypes 3	Host prototypes
Zabbix server	Zabbix server health: Zabbix stats cluster: High availability cluster node discovery	Item prototypes 5	Trigger prototypes 1	Graph prototypes	Host prototypes
Zabbix server	Linux by Zabbix agent: Get filesystems: Mounted filesystem discovery	Item prototypes 7	Trigger prototypes 5	Graph prototypes 2	Host prototypes
Zabbix server	Linux by Zabbix agent: Network interface discovery	Item prototypes 9	Trigger prototypes 4	Graph prototypes 1	Host prototypes
Zabbix server	Zabbix server health: Zabbix proxies stats: Zabbix proxy discovery	Item prototypes 12	Trigger prototypes 4	Graph prototypes	Host prototypes
Zabbix server	Zabbix server health: Zabbix proxy groups stats: Zabbix proxy groups discovery	Item prototypes 7	Trigger prototypes 6	Graph prototypes	Host prototypes

Formato da LLD

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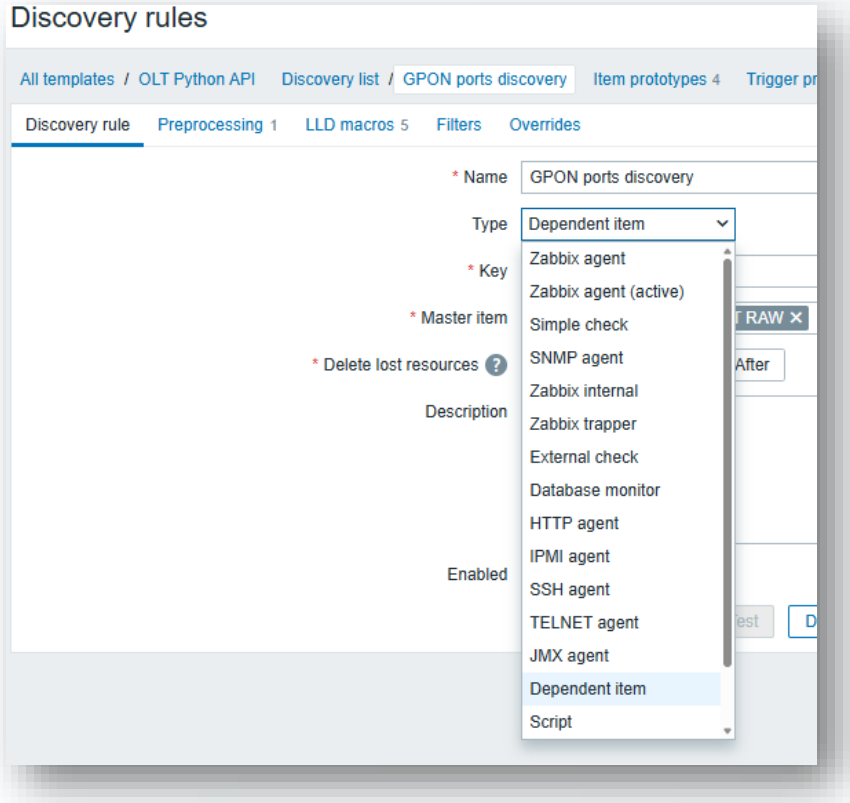
O tipo de coleta feito pela LLD é basicamente o mesmo de um item comum do Zabbix.



Key	Interval	Type
vfs.dev.discovery	1h	Zabbix agent
zabbix.nodes.discovery		Dependent item
vfs.fs.dependent.discovery		Dependent item
net.if.discovery	1h	Zabbix agent
zabbix.proxy.discovery		Dependent item
zabbix.proxy.groups.discovery		Dependent item

Desafios da LLD tradicional

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- Descoberta em multinível
- Relação entre objetos descobertos
- Preservação do contexto entre níveis

Nested LLD (LLD aninhada)

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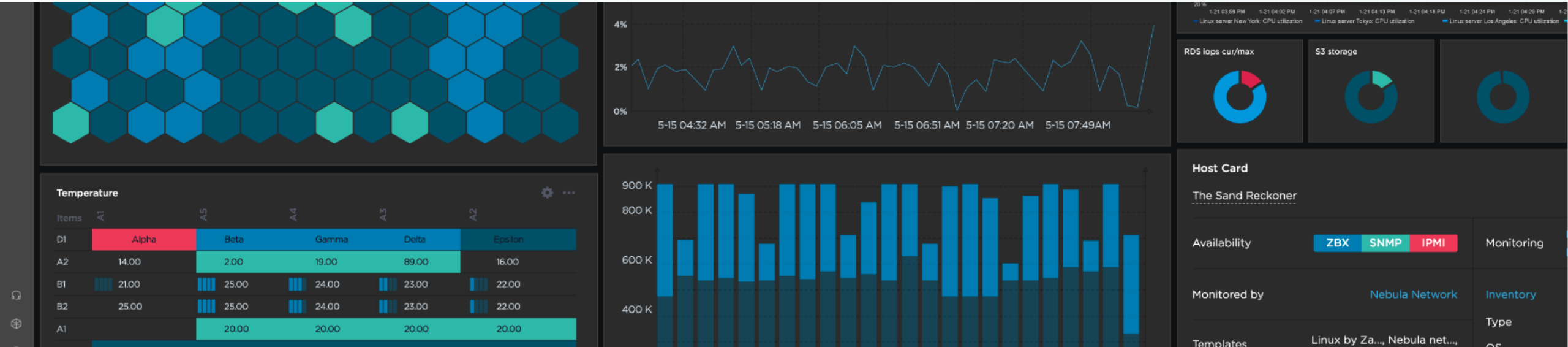
O Zabbix 7.4 introduz uma nova maneira de descoberta.



Nested LLD

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Permite que criemos regras de descoberta dentro de outras regras de descoberta, assim:

- Macros da regra principal (pai) são preservadas nos níveis filhos
- Cada nível pode ter seus próprios protótipos
- Permite descobrir entidades dependentes entre si
- Exemplo: OLT > GPON > ONU

Vamos ao cenário real?

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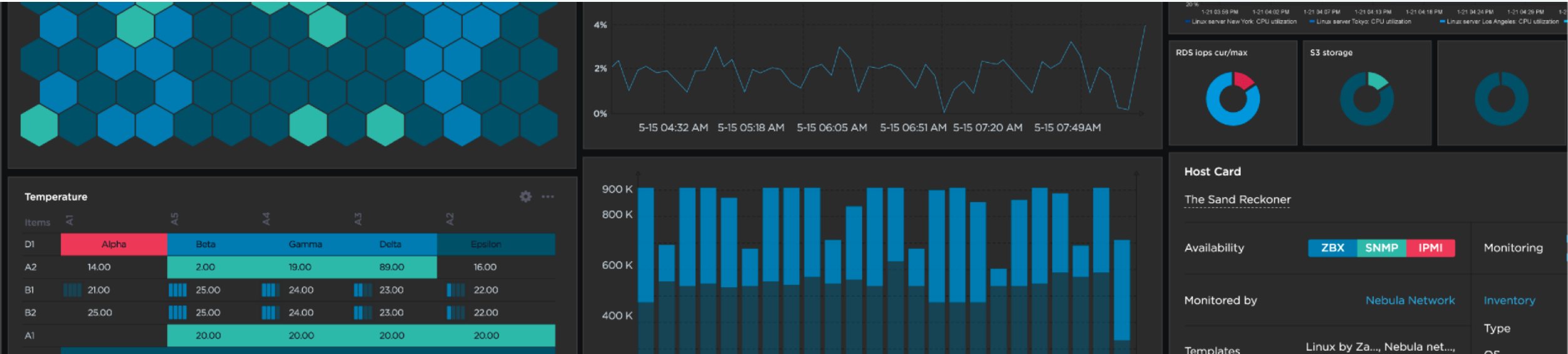
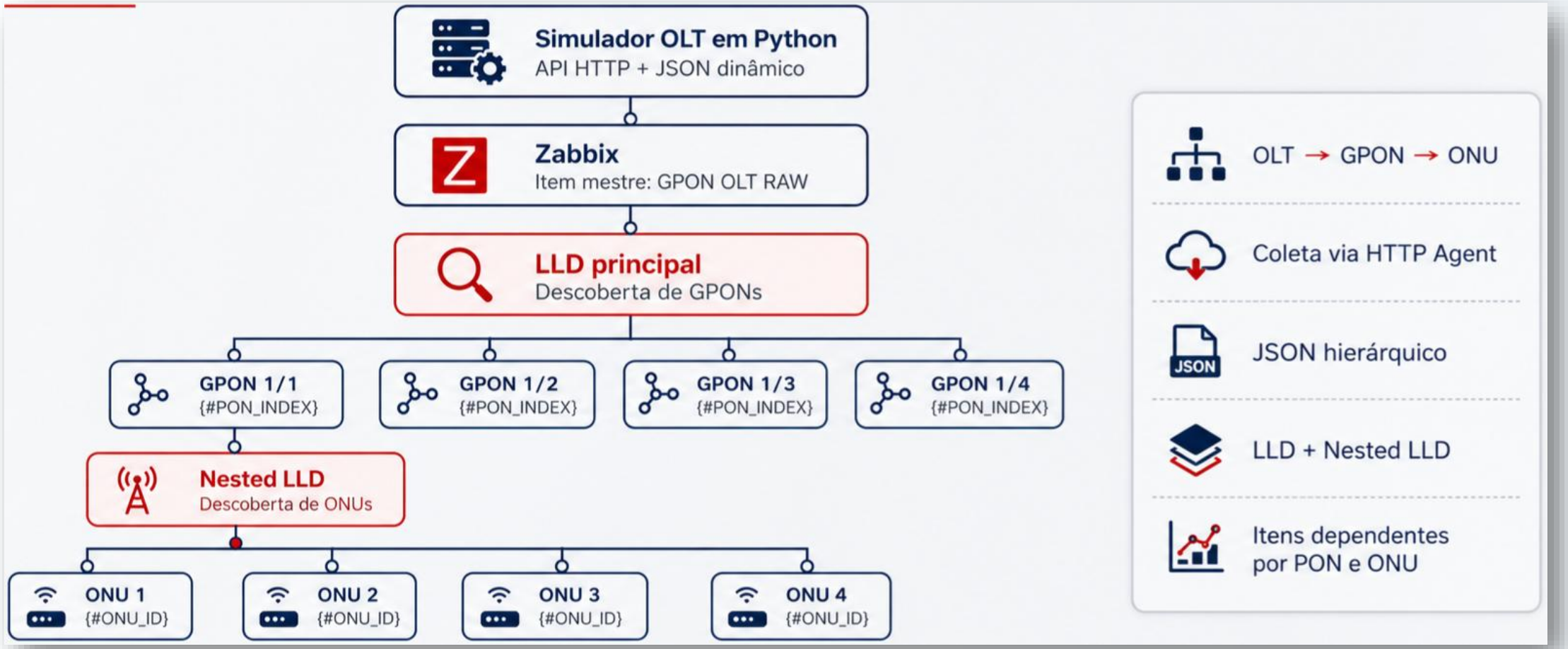


Arquitetura do Lab



Ambiente do Lab

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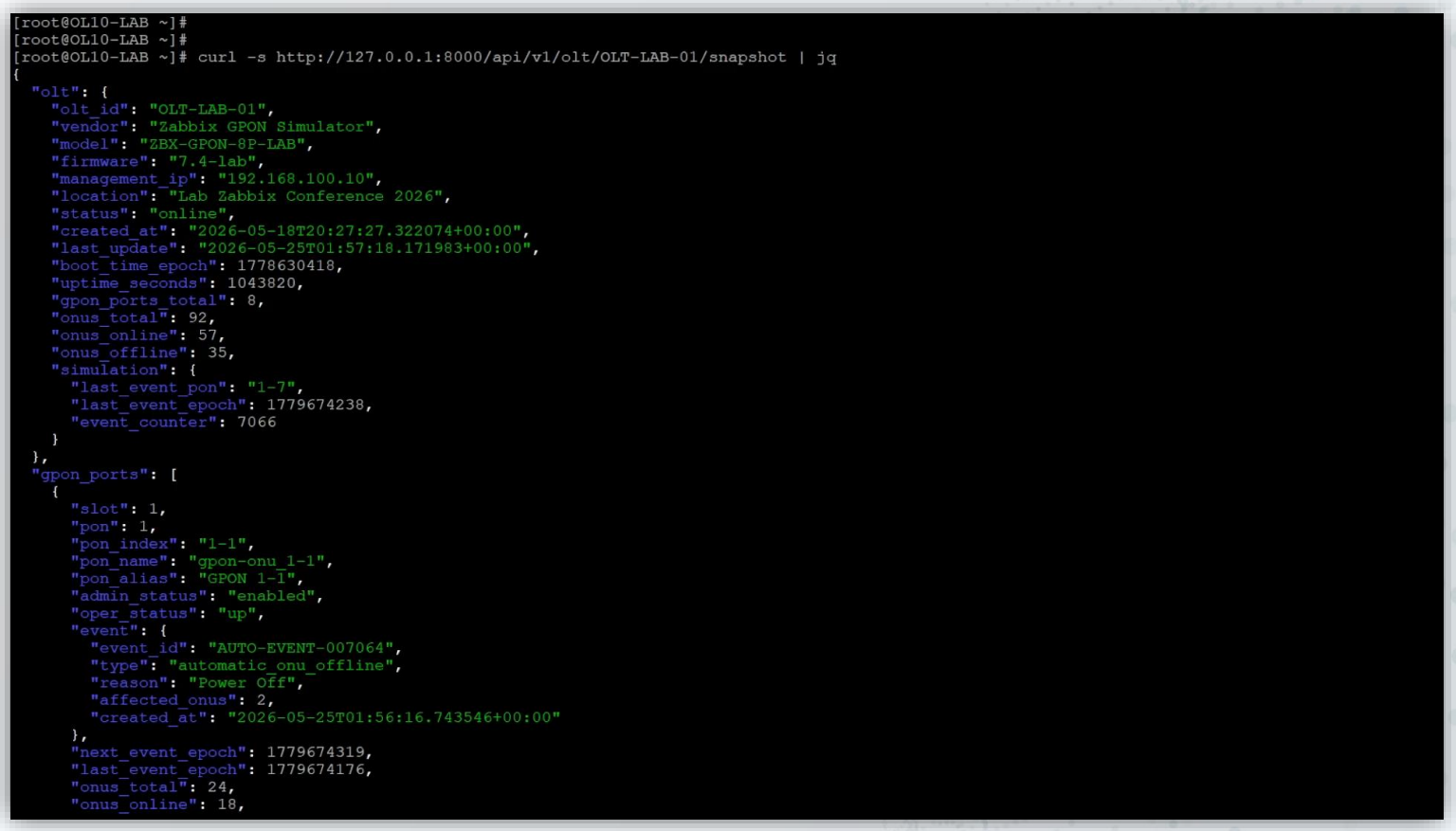
Um script python é responsável por simular uma OLT completa e publicá-la via API.

O script atualiza os valores de estado, potências de transmissão, ONUs online e offline a intervalos irregulares, criando um cenário próximo ao real.



Cenário no Zabbix

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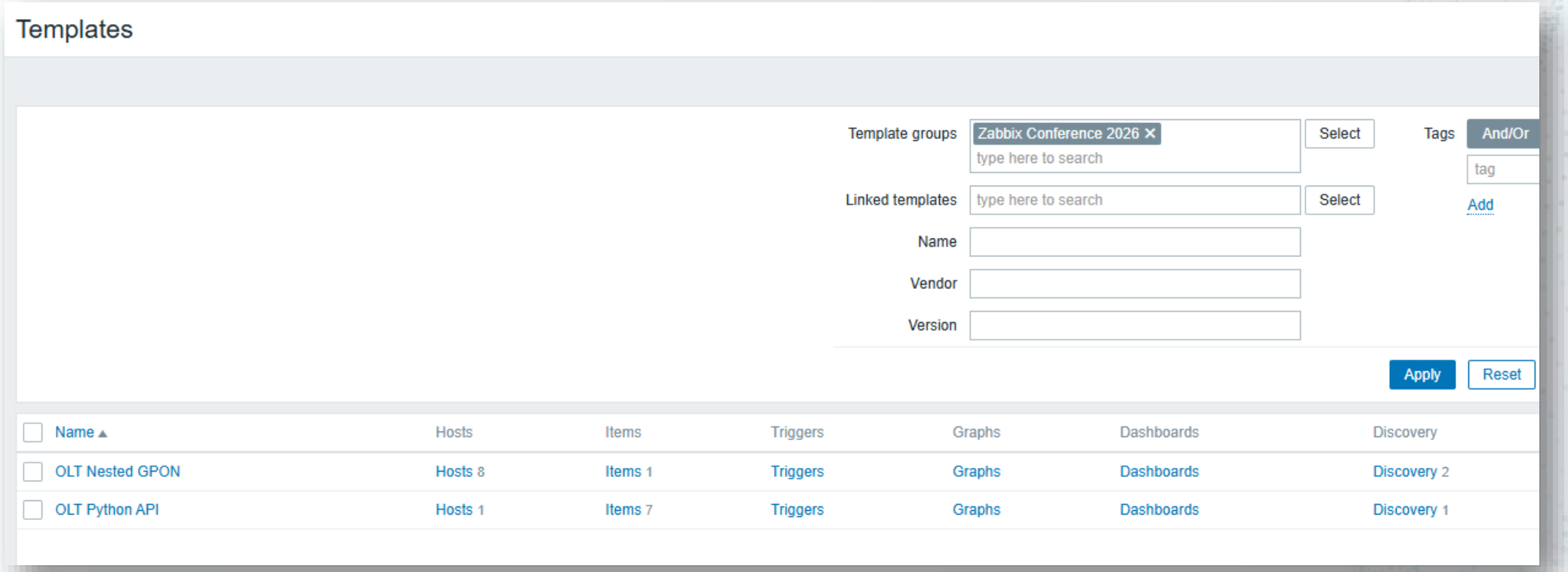
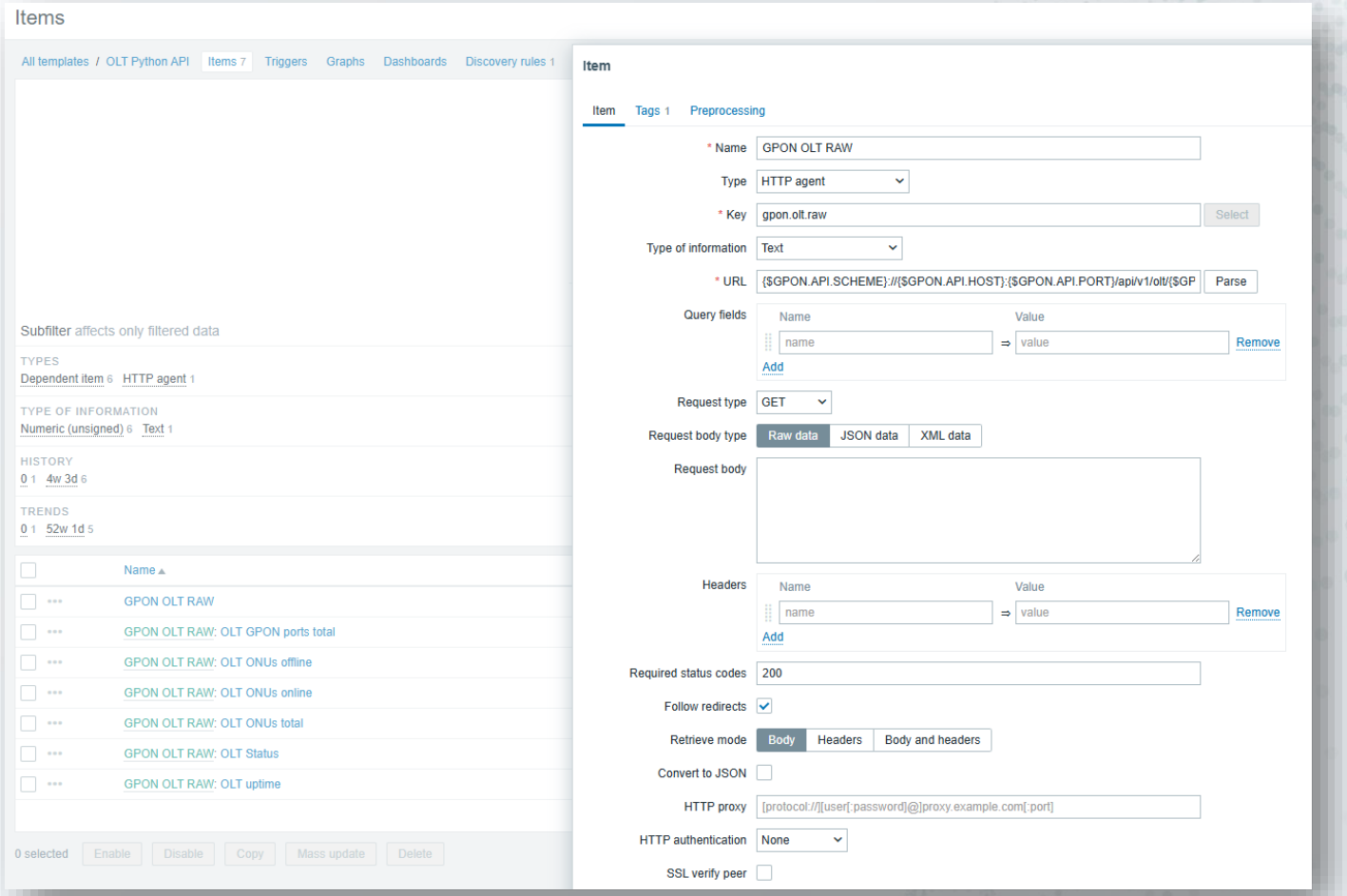
Em nosso cenário temos dois templates:



Cenário no Zabbix

O template OLT Python API é o responsável por se conectar à API e coletar os dados da OLT, GPONs e ONUs.

Tudo é feito através de dependências, minimizando conexões.



Cenário no Zabbix

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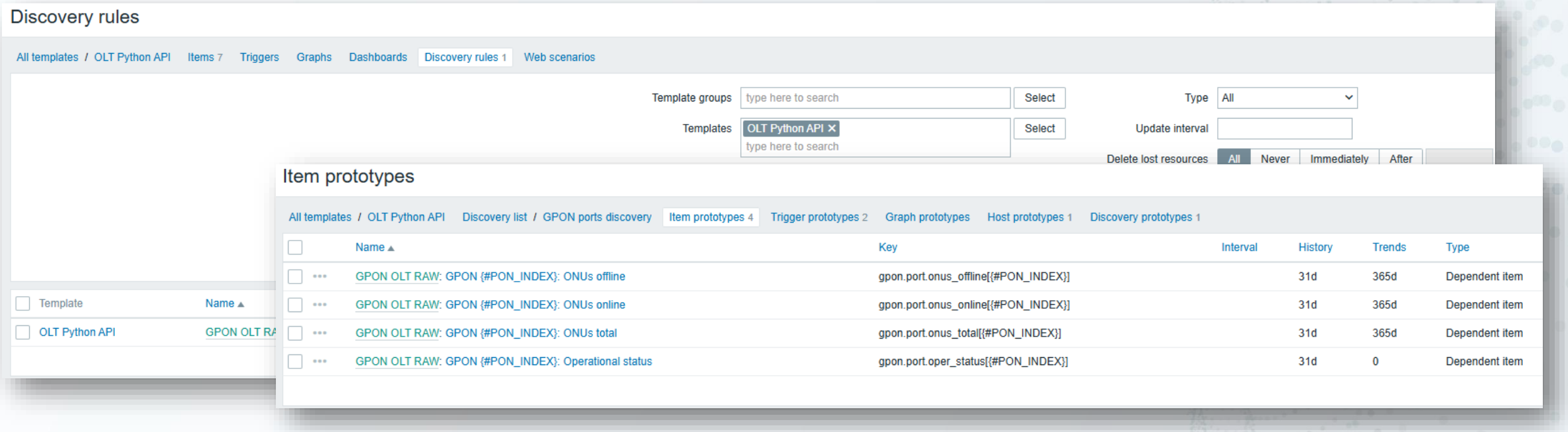
Através de uma regra LLD tradicional o Zabbix descobre todas as PONs e cria os itens com a quantidade de ONUs online, offline, total e estado de cada porta.



Cenário no Zabbix

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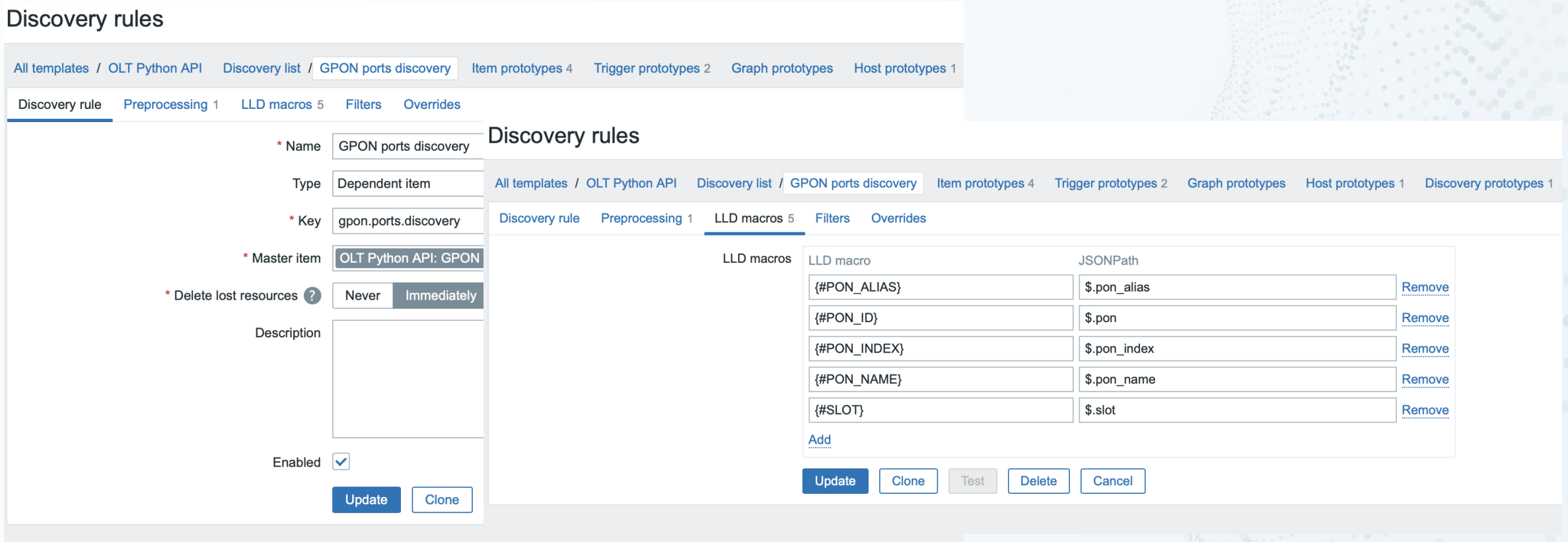
Regra de descoberta principal



Cenário no Zabbix

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Protótipos da LLD principal

Item prototypes

All templates / OLT Python API | Discovery list / GPON ports discovery | Item prototypes 4 | Trigger prototypes 2 | Graph prototypes | Host prototypes 1 | Discovery prototypes 1

Name ▲	Key	Interval	History	Trends	Type
GPON OLT RAW: GPON {#PON_INDEX}: ONUs offline	gpon.port.onus_offline[{#PON_INDEX}]		31d	365d	Dependent item
GPON OLT RAW: GPON {#PON_INDEX}: ONUs online	gpon.port.onus_online[{#PON_INDEX}]		31d	365d	Dependent item
GPON OLT RAW: GPON {#PON_INDEX}: ONUs total	gpon.port.onus_total[{#PON_INDEX}]		31d	365d	Dependent item
GPON OLT RAW: GPON {#PON_INDEX}: Operational status	gpon.port.oper_status[{#PON_INDEX}]		31d	0	Dependent item

Host prototypes

All templates / OLT Python API | Discovery list / GPON ports discovery | Item prototypes 4 | Trigger prototypes 2 | Graph prototypes | Host prototypes 1 | Discovery prototypes 1

Name ▲	Templates	Create enabled
OLT GPON {#PON_INDEX}	OLT Nested GPON	Yes

Cenário no Zabbix

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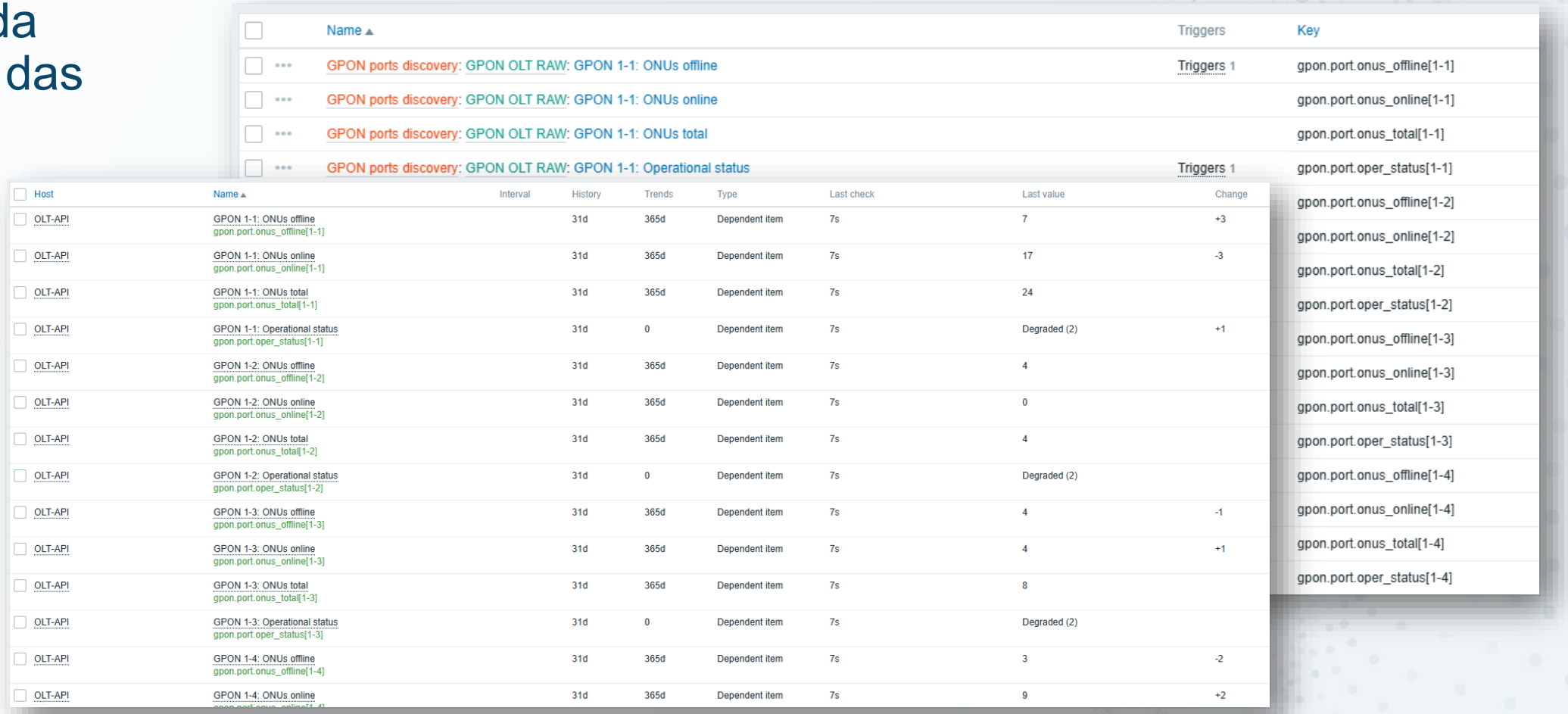
Resultado da descoberta das PONs:



	Name ▲	Triggers	Key
	GPON ports discovery: GPON OLT RAW: GPON 1-1: ONUs offline	Triggers 1	gpon.port.onus_offline[1-1]
	GPON ports discovery: GPON OLT RAW: GPON 1-1: ONUs online		gpon.port.onus_online[1-1]
	GPON ports discovery: GPON OLT RAW: GPON 1-1: ONUs total		gpon.port.onus_total[1-1]
	GPON ports discovery: GPON OLT RAW: GPON 1-1: Operational status	Triggers 1	gpon.port.oper_status[1-1]
			gpon.port.onus_offline[1-2]
			gpon.port.onus_online[1-2]
			gpon.port.onus_total[1-2]
			gpon.port.oper_status[1-2]
			gpon.port.onus_offline[1-3]
			gpon.port.onus_online[1-3]
			gpon.port.onus_total[1-3]
			gpon.port.oper_status[1-3]
			gpon.port.onus_offline[1-4]
			gpon.port.onus_online[1-4]
			gpon.port.onus_total[1-4]
			gpon.port.oper_status[1-4]

Host	Name ▲	Interval	History	Trends	Type	Last check	Last value	Change
OLT-API	GPON 1-1: ONUs offline gpon.port.onus_offline[1-1]		31d	365d	Dependent item	7s	7	+3
OLT-API	GPON 1-1: ONUs online gpon.port.onus_online[1-1]		31d	365d	Dependent item	7s	17	-3
OLT-API	GPON 1-1: ONUs total gpon.port.onus_total[1-1]		31d	365d	Dependent item	7s	24	
OLT-API	GPON 1-1: Operational status gpon.port.oper_status[1-1]		31d	0	Dependent item	7s	Degraded (2)	+1
OLT-API	GPON 1-2: ONUs offline gpon.port.onus_offline[1-2]		31d	365d	Dependent item	7s	4	
OLT-API	GPON 1-2: ONUs online gpon.port.onus_online[1-2]		31d	365d	Dependent item	7s	0	
OLT-API	GPON 1-2: ONUs total gpon.port.onus_total[1-2]		31d	365d	Dependent item	7s	4	
OLT-API	GPON 1-2: Operational status gpon.port.oper_status[1-2]		31d	0	Dependent item	7s	Degraded (2)	
OLT-API	GPON 1-3: ONUs offline gpon.port.onus_offline[1-3]		31d	365d	Dependent item	7s	4	-1
OLT-API	GPON 1-3: ONUs online gpon.port.onus_online[1-3]		31d	365d	Dependent item	7s	4	+1
OLT-API	GPON 1-3: ONUs total gpon.port.onus_total[1-3]		31d	365d	Dependent item	7s	8	
OLT-API	GPON 1-3: Operational status gpon.port.oper_status[1-3]		31d	0	Dependent item	7s	Degraded (2)	
OLT-API	GPON 1-4: ONUs offline gpon.port.onus_offline[1-4]		31d	365d	Dependent item	7s	3	-2
OLT-API	GPON 1-4: ONUs online		31d	365d	Dependent item	7s	9	+2

Cenário no Zabbix

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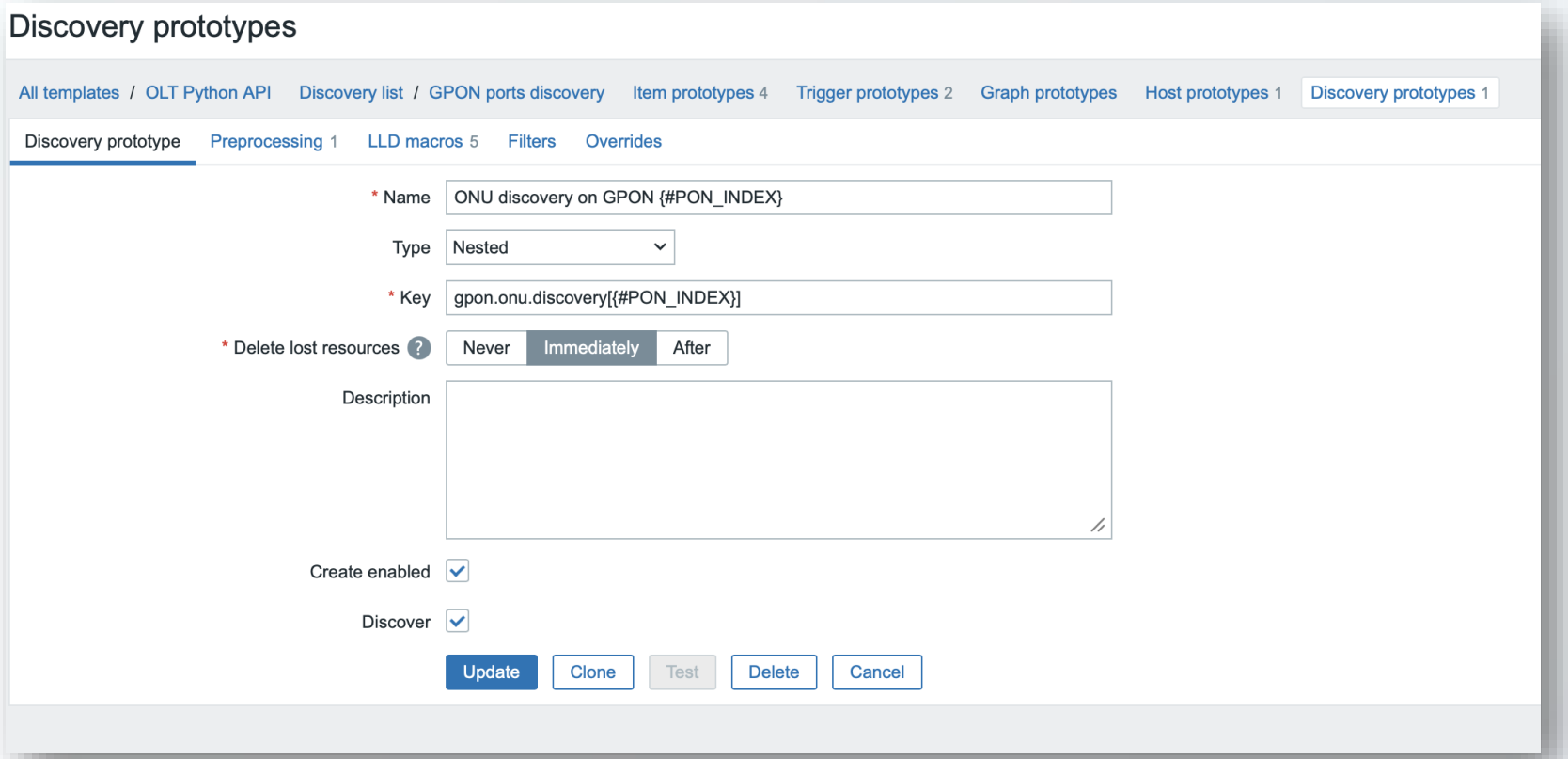
A LLD nested é responsável por descobrir e criar itens para cada ONU dentro das GPONs



Cenário no Zabbix

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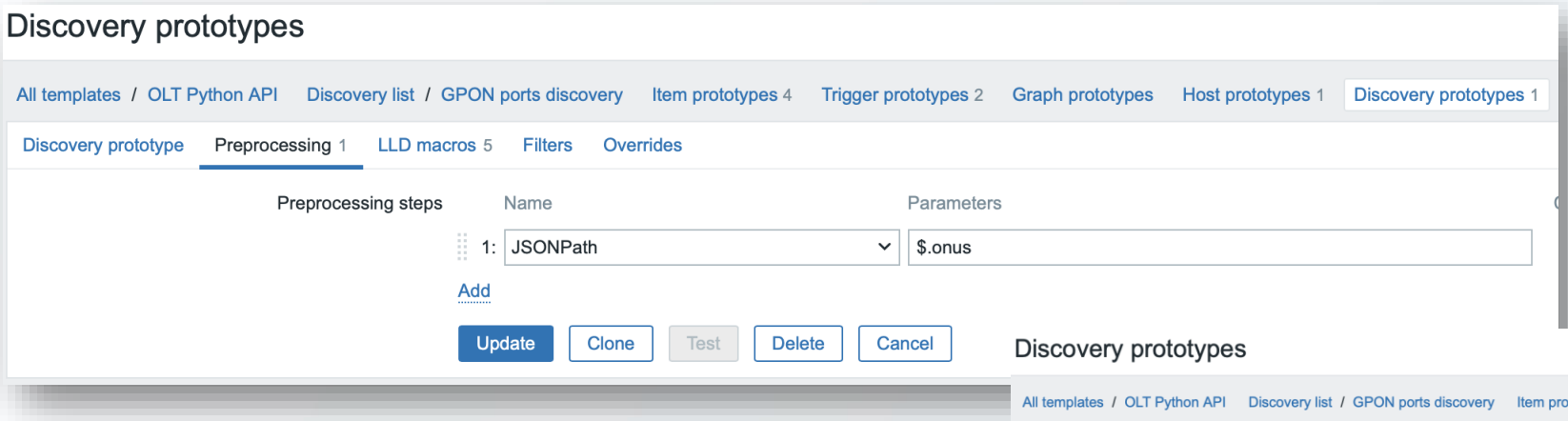
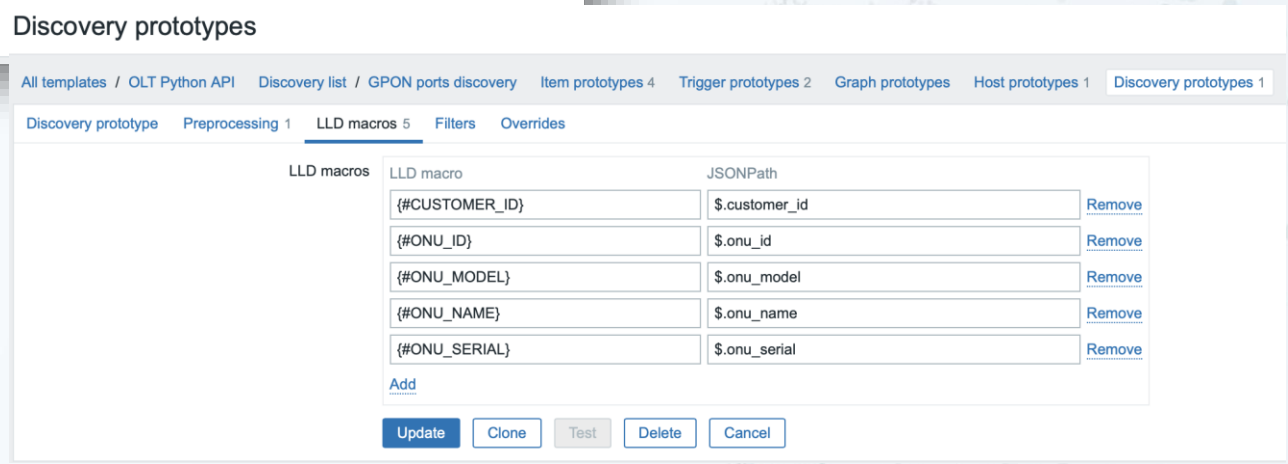
Configuração da nova nested LLD





Cenário no Zabbix

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Protótipos de item da nested LLD

Item prototypes

Create item prototype

All templates / OLT Python API Discovery list / ••• / ONU discovery on GPON {#PON_I… Item prototypes 9 Trigger prototypes Graph prototypes Host prototypes Discovery prototypes

Name ▲	Key	Interval	History	Trends	Type	Create enabled	Discover	Tags
GPON OLT RAW: {#ONU_NAME}: Distance	gpon.onu.distance[{#PON_INDEX},{#ONU_ID}]		31d	365d	Dependent item	Yes	Yes	component: onu, data-type: distance, onu_id: {#ONU_ID}
GPON OLT RAW: {#ONU_NAME}: Last offline reason	gpon.onu.last.off[{#PON_INDEX},{#ONU_ID}]		31d		Dependent item	Yes	Yes	component: onu, data-type: last_offline, onu_id: {#ONU_ID}
GPON OLT RAW: {#ONU_NAME}: OLT RX power	gpon.onu.olt.rx.pw[{#PON_INDEX},{#ONU_ID}]		31d	365d	Dependent item	Yes	Yes	component: onu, data-type: olt_rx_power, onu_id: {#ONU_ID}
GPON OLT RAW: {#ONU_NAME}: RX power	gpon.onu.rx.pw[{#PON_INDEX},{#ONU_ID}]		31d	365d	Dependent item	Yes	Yes	component: onu, data-type: rx_power, onu_id: {#ONU_ID}
GPON OLT RAW: {#ONU_NAME}: Serial number	gpon.onu.serial[{#PON_INDEX},{#ONU_ID}]		31d		Dependent item	Yes	Yes	component: onu, data-type: serial_number, onu_id: {#ONU_ID}
GPON OLT RAW: {#ONU_NAME}: Status	gpon.onu.status[{#PON_INDEX},{#ONU_ID}]		31d		Dependent item	Yes	Yes	component: onu, data-type, onu_id: {#ONU_ID}
GPON OLT RAW: {#ONU_NAME}: Temperature	gpon.onu.temp[{#PON_INDEX},{#ONU_ID}]		31d	365d	Dependent item	Yes	Yes	component: onu, data-type: temperature, onu_id: {#ONU_ID}
GPON OLT RAW: {#ONU_NAME}: TX power	gpon.onu.tx.pw[{#PON_INDEX},{#ONU_ID}]		31d	365d	Dependent item	Yes	Yes	component: onu, data-type: tx_power, onu_id: {#ONU_ID}
GPON OLT RAW: {#ONU_NAME}: Uptime	gpon.onu.uptime[{#PON_INDEX},{#ONU_ID}]		31d	365d	Dependent item	Yes	Yes	component: onu, data-type: uptime, onu_id: {#ONU_ID}

Displaying 9 of 9 found

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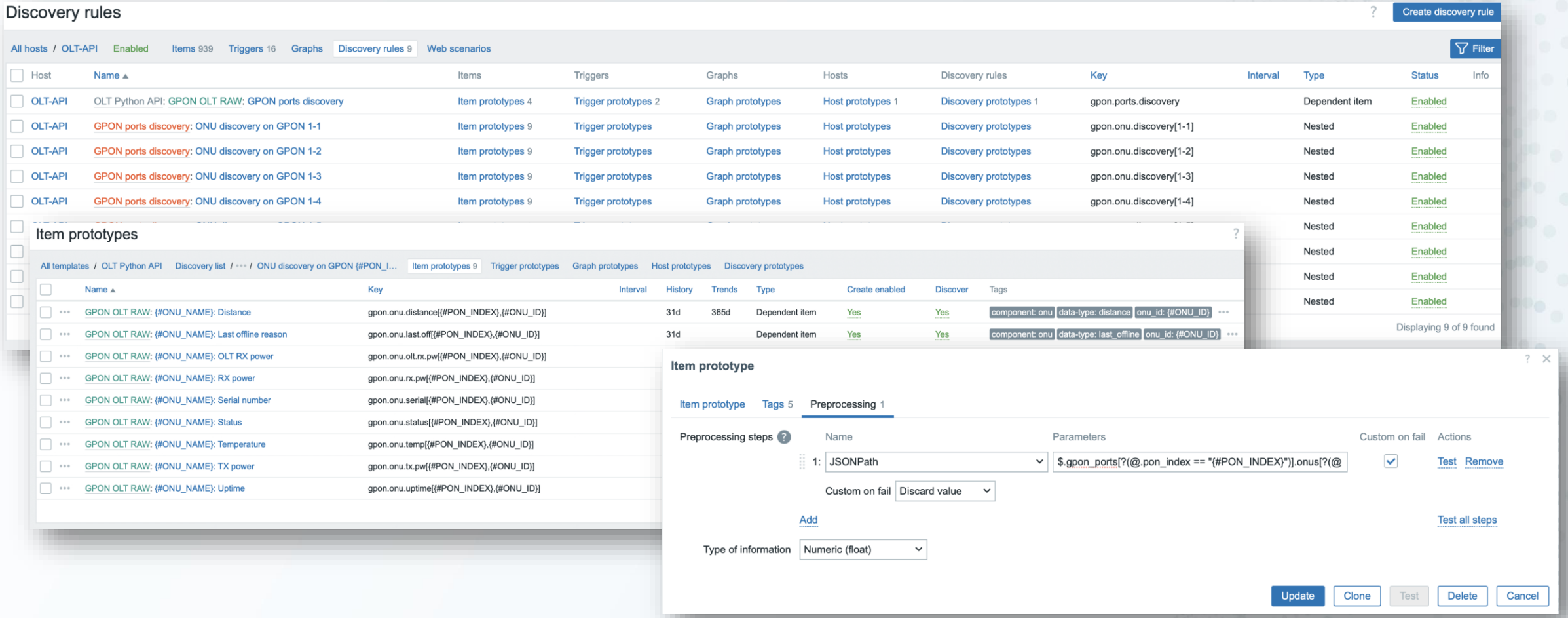
Protótipos de descoberta criados no host



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Itens criados no host

GPON ports discovery: GPON OLT RAW: GPON 1-8: ONUs online		gpon.port.onus_online[1-8]		31d	365d	Dependent item	Enabled	component: gpon, data-type: onus_online, pon: 1-8
GPON ports discovery: GPON OLT RAW: GPON 1-8: ONUs total		gpon.port.onus_total[1-8]		31d	365d	Dependent item	Enabled	component: gpon, data-type: onus_total, pon: 1-8
GPON ports discovery: GPON OLT RAW: GPON 1-8: Operational status	Triggers 1	gpon.port.oper_status[1-8]		31d	0	Dependent item	Enabled	component: gpon, data-type: operational_status, pon: 1-8
OLT Python API: GPON OLT RAW		gpon.olt.raw	15s	0		HTTP agent	Enabled	scope: OLT
OLT Python API: GPON OLT RAW: OLT GPON ports total		gpon.olt.gpon_ports_total		31d	365d	Dependent item	Enabled	scope: OLT
OLT Python API: GPON OLT RAW: OLT ONUs offline		gpon.olt.onus_offline		31d	365d	Dependent item	Enabled	scope: OLT
OLT Python API: GPON OLT RAW: OLT ONUs online		gpon.olt.onus_online		31d	365d	Dependent item	Enabled	scope: OLT
OLT Python API: GPON OLT RAW: OLT ONUs total		gpon.olt.onus_total		31d	365d	Dependent item	Enabled	scope: OLT
OLT Python API: GPON OLT RAW: OLT Status		olt.status		31d	0	Dependent item	Enabled	scope: OLT
OLT Python API: GPON OLT RAW: OLT uptime		gpon.olt.uptime		31d	365d	Dependent item	Enabled	scope: OLT
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-001: Distance		gpon.onu.distance[1-1,1]		31d	365d	Dependent item	Enabled	component: onu, data-type: distance, onu_id: 1
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-001: Last offline reason		gpon.onu.last.off[1-1,1]		31d		Dependent item	Enabled	component: onu, data-type: last_offline, onu_id: 1
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-001: OLT RX power		gpon.onu.olt.rx.pw[1-1,1]		31d	365d	Dependent item	Enabled	component: onu, data-type: olt_rx_power, onu_id: 1
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-001: RX power		gpon.onu.rx.pw[1-1,1]		31d	365d	Dependent item	Enabled	component: onu, data-type: rx_power, onu_id: 1
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-001: Serial number		gpon.onu.serial[1-1,1]		31d		Dependent item	Enabled	component: onu, data-type: serial_number, onu_id: 1
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-001: Status		gpon.onu.status[1-1,1]		31d		Dependent item	Enabled	component: onu, data-type, onu_id: 1
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-001: Temperature		gpon.onu.temp[1-1,1]		31d	365d	Dependent item	Enabled	component: onu, data-type: temperature, onu_id: 1
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-001: TX power		gpon.onu.tx.pw[1-1,1]		31d	365d	Dependent item	Enabled	component: onu, data-type: tx_power, onu_id: 1
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-001: Uptime		gpon.onu.uptime[1-1,1]		31d	365d	Dependent item	Enabled	component: onu, data-type: uptime, onu_id: 1
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-002: Distance		gpon.onu.distance[1-1,2]		31d	365d	Dependent item	Enabled	component: onu, data-type: distance, onu_id: 2
ONU discovery on GPON 1-1: GPON OLT RAW: ONU-1-1-002: Last offline reason		gpon.onu.last.off[1-1,2]		31d		Dependent item	Enabled	component: onu, data-type: last_offline, onu_id: 2

Segundo cenário

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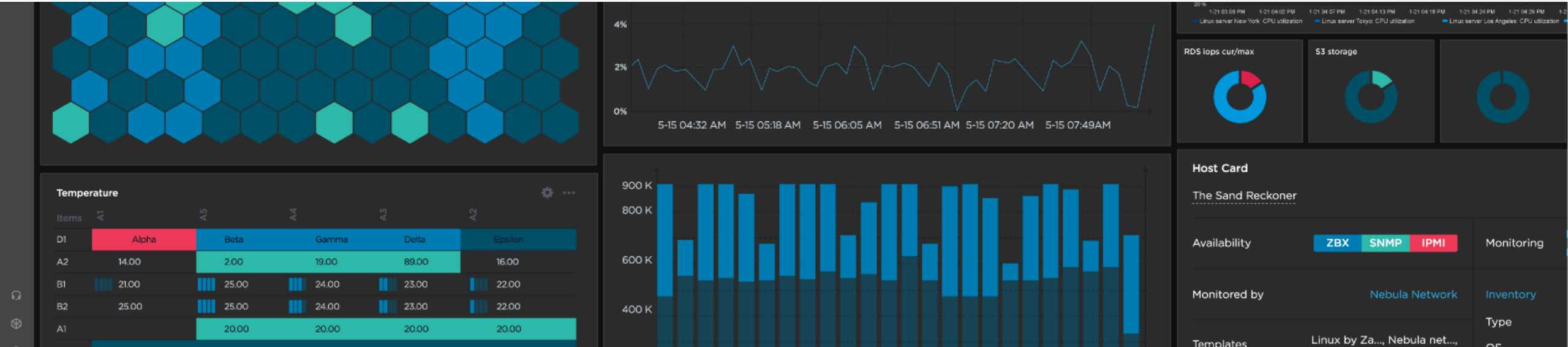
Usando a regra de LLD principal com protótipo de host



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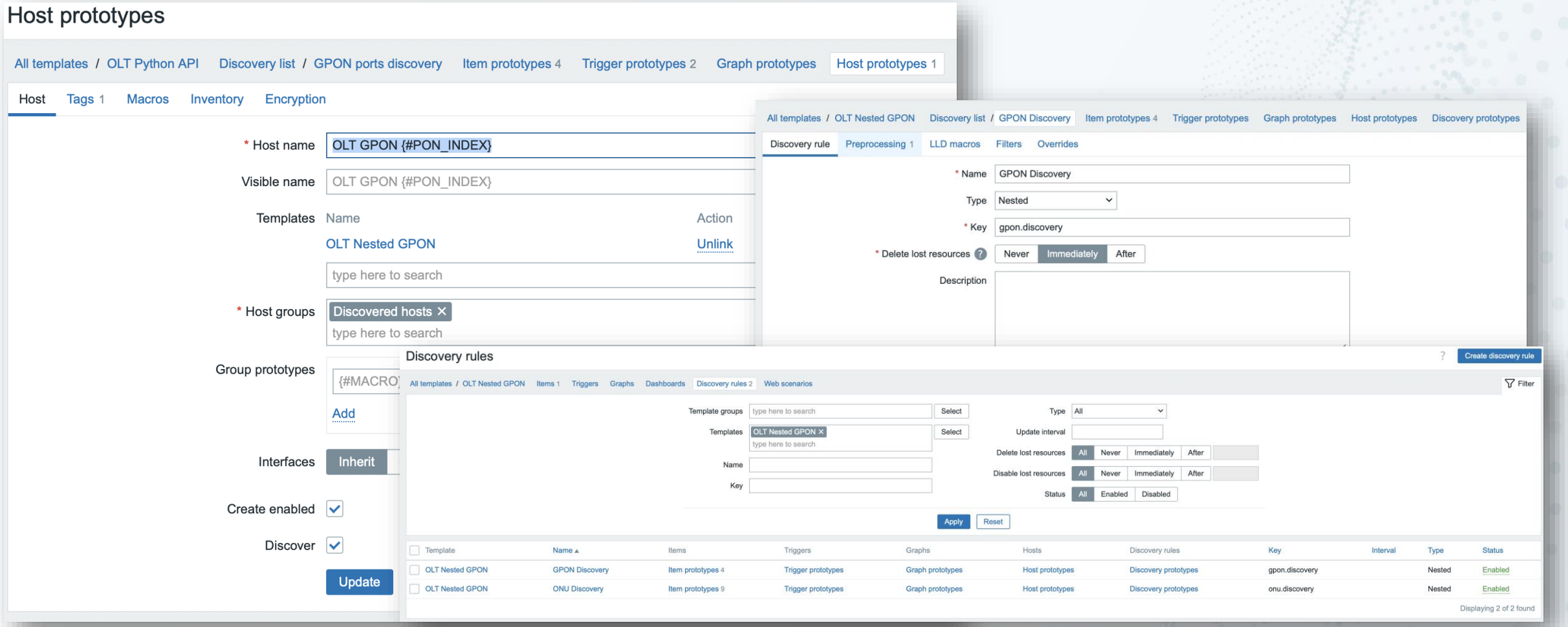

Cenário no Zabbix

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Hosts criados a partir dos protótipos

Hosts

Host Wizard | Create host | Import | Filter

Name ▲	Items	Triggers	Graphs	Discovery	Web	Interface	Proxy	Templates	Status	Availability	Agent encryption	Info	Tags
OLT-API	Items 939	Triggers 16	Graphs	Discovery 9	Web			OLT Python API	Enabled		None		device: OLT
GPON ports discovery: OLT GPON 1-1	Items 113	Triggers	Graphs	Discovery 2	Web			OLT Nested GPON	Enabled		None		component: GPON
GPON ports discovery: OLT GPON 1-2	Items 185	Triggers	Graphs	Discovery 2	Web			OLT Nested GPON	Enabled		None		component: GPON
GPON ports discovery: OLT GPON 1-3	Items 59	Triggers	Graphs	Discovery 2	Web			OLT Nested GPON	Enabled		None		component: GPON
GPON ports discovery: OLT GPON 1-4	Items 95	Triggers	Graphs	Discovery 2	Web			OLT Nested GPON	Enabled		None		component: GPON
GPON ports discovery: OLT GPON 1-5	Items 149	Triggers	Graphs	Discovery 2	Web			OLT Nested GPON	Enabled		None		component: GPON
GPON ports discovery: OLT GPON 1-6	Items 185	Triggers	Graphs	Discovery 2	Web			OLT Nested GPON	Enabled		None		component: GPON
GPON ports discovery: OLT GPON 1-7	Items 41	Triggers	Graphs	Discovery 2	Web			OLT Nested GPON	Enabled		None		component: GPON
GPON ports discovery: OLT GPON 1-8	Items 113	Triggers	Graphs	Discovery 2	Web			OLT Nested GPON	Enabled		None		component: GPON

Cenário no Zabbix

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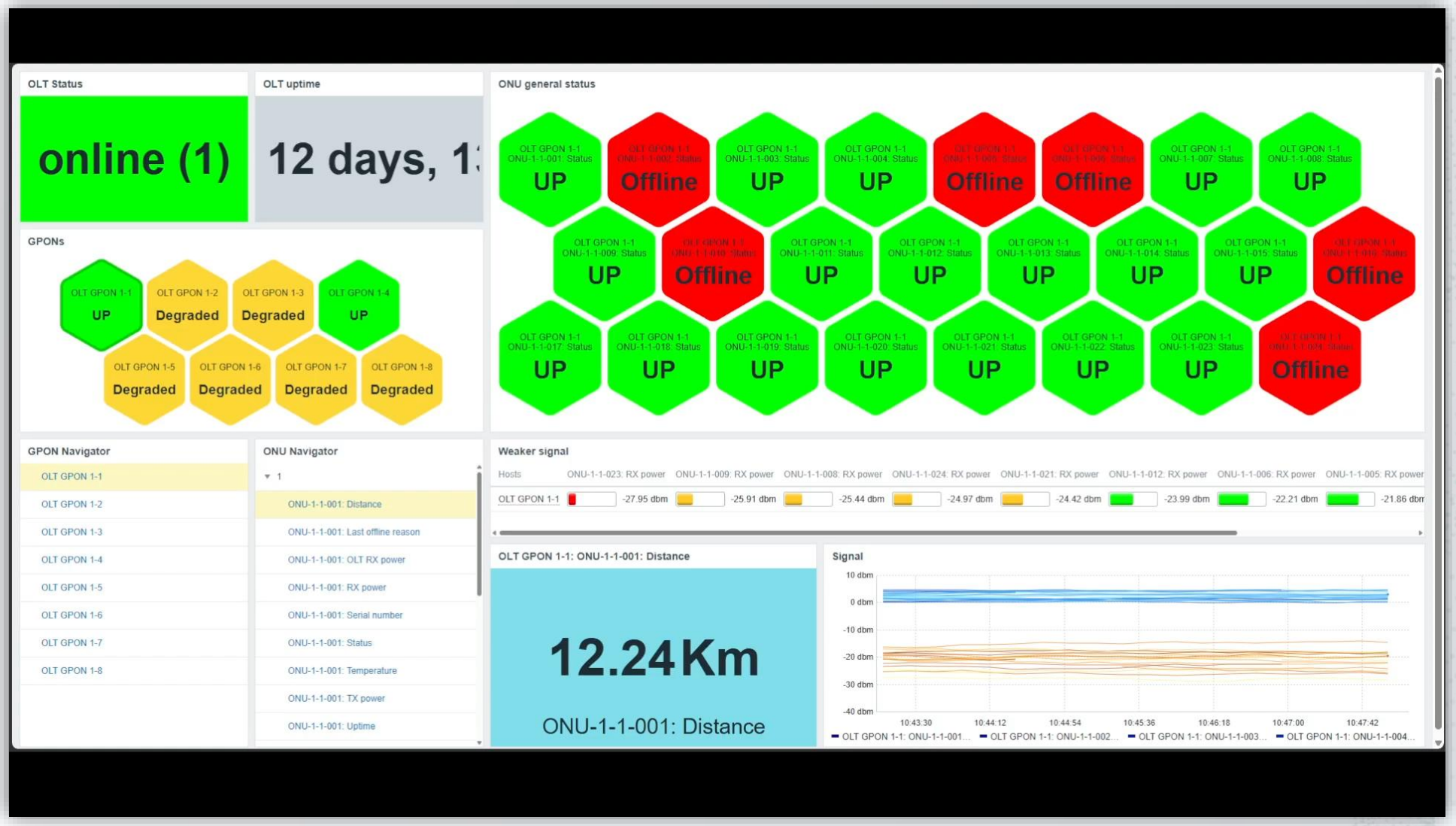
Latest data dos itens dos protótipos de host

Host	Name ▲	Interval	History	Trends	Type	Last check	Last value	Change	Tags
OLT GPON 1-6	GPON 1-6: ONUs offline gpon.port.onus_offline[1-6]		31d	365d	Dependent item	0	3		
OLT GPON 1-6	GPON 1-6: ONUs online gpon.port.onus_online[1-6]		31d	365d	Dependent item	0	17		
OLT GPON 1-6	GPON 1-6: ONUs total gpon.port.onus_total[1-6]		31d	365d	Dependent item	0	20		
OLT GPON 1-6	GPON 1-6: Operational status gpon.port.oper_status[1-6]		31d	365d	Dependent item	0	Up (1)		
OLT GPON 1-6	GPON OLT RAW gpon.olt.raw	15s	0		HTTP agent				component: olt, data-type: raw
OLT GPON 1-6	ONU-1-6-001: Distance gpon.onu.distance[1-6,1]		7d	365d	Dependent item	0	2.23 Km		component: onu, data-type: distance, onu_id: 1
OLT GPON 1-6	ONU-1-6-001: Last offline reason gpon.onu.last.off[1-6,1]		7d		Dependent item	0	null		component: onu, data-type: last_offline, onu_id: 1
OLT GPON 1-6	ONU-1-6-001: OLT RX power gpon.onu.olt.rx.pw[1-6,1]		7d	365d	Dependent item	0	-16.04 dbm	+0.56 dbm	component: onu, data-type: olt_rx_pwr, onu_id: 1
OLT GPON 1-6	ONU-1-6-001: RX power gpon.onu.rx.pw[1-6,1]		7d	365d	Dependent item	0	-18.06 dbm	-0.5 dbm	component: onu, data-type: rx_pwr, onu_id: 1
OLT GPON 1-6	ONU-1-6-001: Serial number gpon.onu.serial[1-6,1]		7d		Dependent item	0	ZBXG01060001		component: onu, data-type: serial-number, onu_id: 1
OLT GPON 1-6	ONU-1-6-001: Status gpon.onu.status[1-6,1]		7d	0	Dependent item	0	online (1)		component: onu, data-type: status, onu_id: 1
OLT GPON 1-6	ONU-1-6-001: Temperature gpon.onu.temp[1-6,1]		7d	365d	Dependent item	0	49.8 °C	+0.3 °C	component: onu, data-type: temperature, onu_id: 1
OLT GPON 1-6	ONU-1-6-001: TX power gpon.onu.tx.pw[1-6,1]		7d	365d	Dependent item	0	1.66 dbm	-0.12 dbm	component: onu, data-type: tx_pwr, onu_id: 1
OLT GPON 1-6	ONU-1-6-001: Uptime gpon.onu.uptime[1-6,1]		7d	365d	Dependent item	0	05:35:42	+00:04:46	component: onu, data-type: uptime, onu_id: 1
OLT GPON 1-6	ONU-1-6-002: Distance gpon.onu.distance[1-6,2]		7d	365d	Dependent item	0	12.57 Km		component: onu, data-type: distance, onu_id: 2
OLT GPON 1-6	ONU-1-6-002: Last offline reason gpon.onu.last.off[1-6,2]		7d		Dependent item	0	null		component: onu, data-type: last_offline, onu_id: 2
OLT GPON 1-6	ONU-1-6-002: OLT RX power gpon.onu.olt.rx.pw[1-6,2]		7d	365d	Dependent item	0	-18.56 dbm	+0.14 dbm	component: onu, data-type: olt_rx_pwr, onu_id: 2

Resultado do monitoramento



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Obrigado
Thank you

Leonardo Southier

Technical Support Engineer & Trainer