

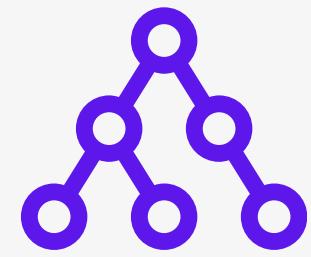
INGENIERÍA DE REDES CLOUD

PRESENTACIÓN FINAL PROYECTO

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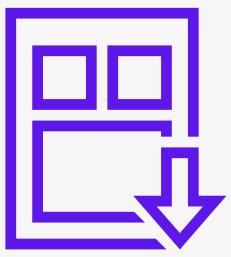


CONCEPTOS PREVIOS



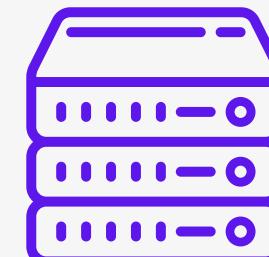
Topología

Diagrama de red



Plantilla

Template de configuración
de slice



Slice

Instancia en ejecución de
una plantilla

ROLES DE USUARIO

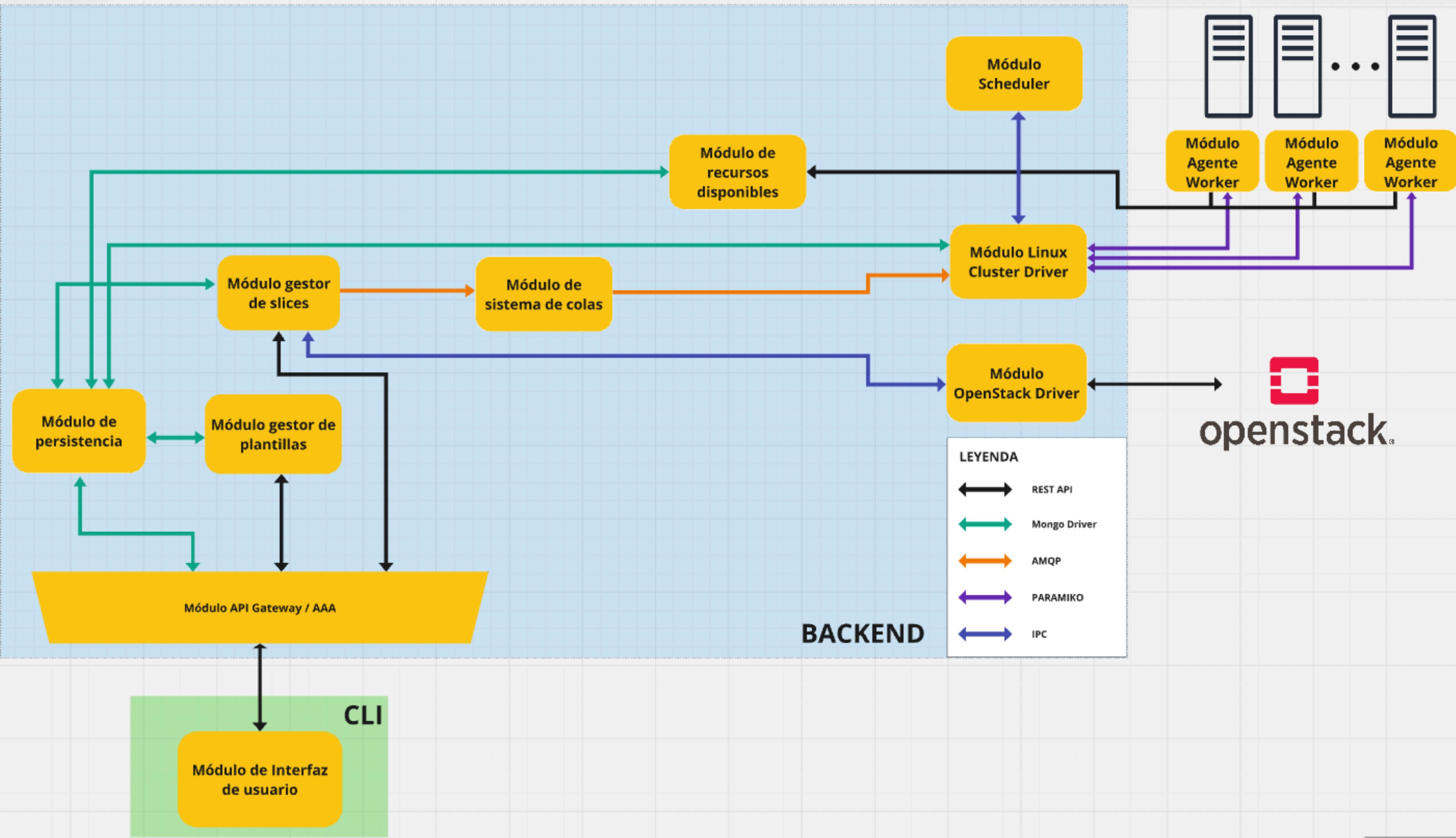
ADMINISTRADOR

Encargado de monitorear y gestionar la infraestructura de nube y sus recursos

REGULAR USER

Hace uso de los recursos computacionales ofrecidos a través de la nube privada

ARQUITECTURA



VM PLACEMENT TEÓRICO

BMC



OS independent

IPMI

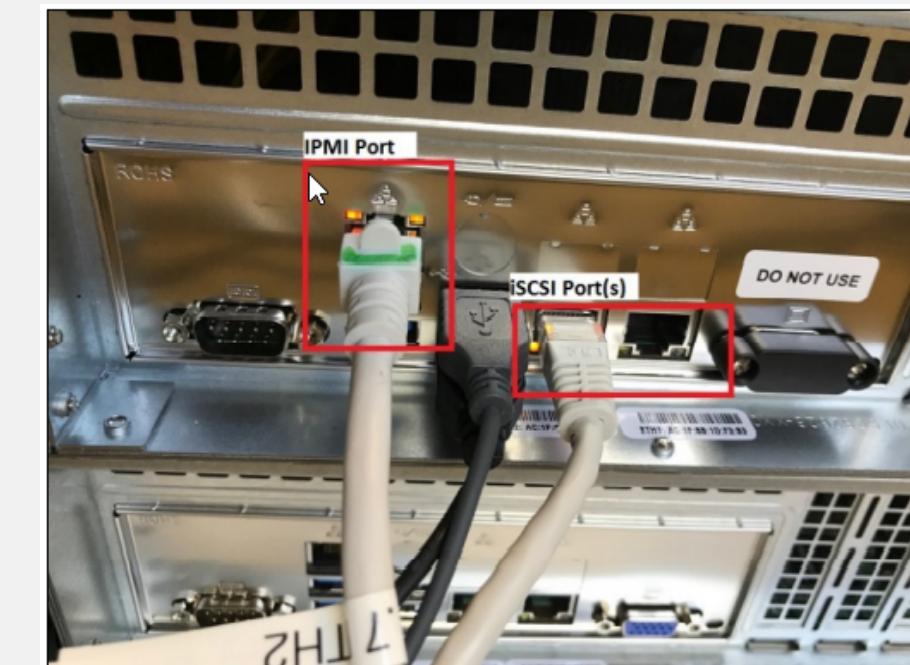


OOB management

VM PLACEMENT TEÓRICO

Vendor	BMC's Name	BMC's Siglas
HP	Integrated Lights Out	iLO
Dell	Dell Remote Access Control	DRAC
IBM	Remote Supervisor Adapter	RSA
Cisco	Integrated Management Controller	IMC

IPMI
TOOL



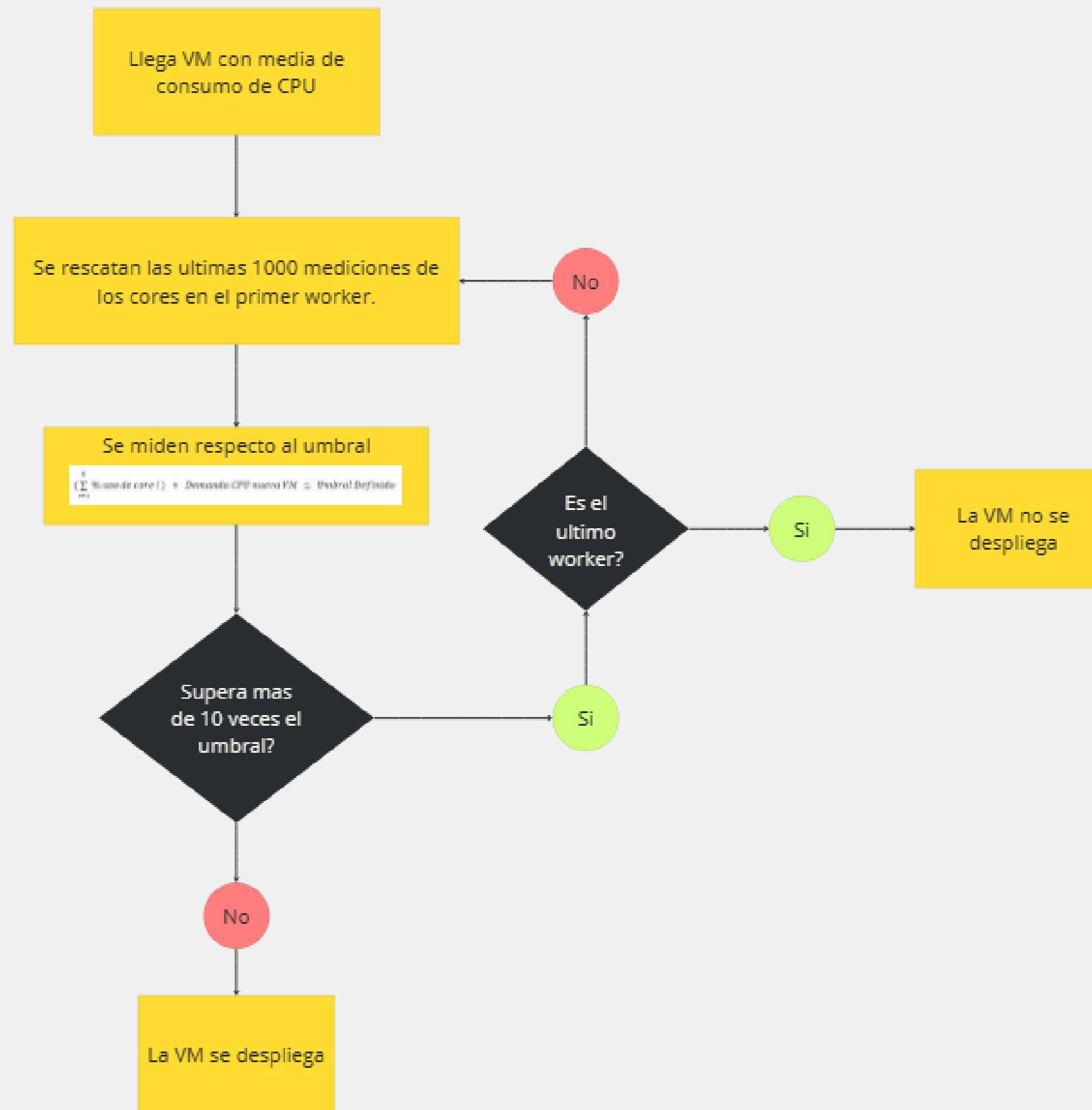
VM PLACEMENT TEÓRICO

```
_id: ObjectId('668229ae31206d6171d727f2')
worker1 : "10.0.0.30"
Core0(%) : 77
Core1(%) : 63
Core2(%) : 73
Core3(%) : 69
Core4(%) : 70
Core5(%) : 81
Core6(%) : 66
Core7(%) : 64
MemoriaUsada(Mb) : 982.8
MemoriaDisponible(Mb) : 7025.3
MemoriaTotal(Mb) : 8330.4
AlmacenamientoUsado(Gb) : 3.3
AlmacenamientoUsado(%) : 17
AlmacenamientoTotal(Gb) : 19.2
timestamp : "30-06-2024 22:59:42"
```

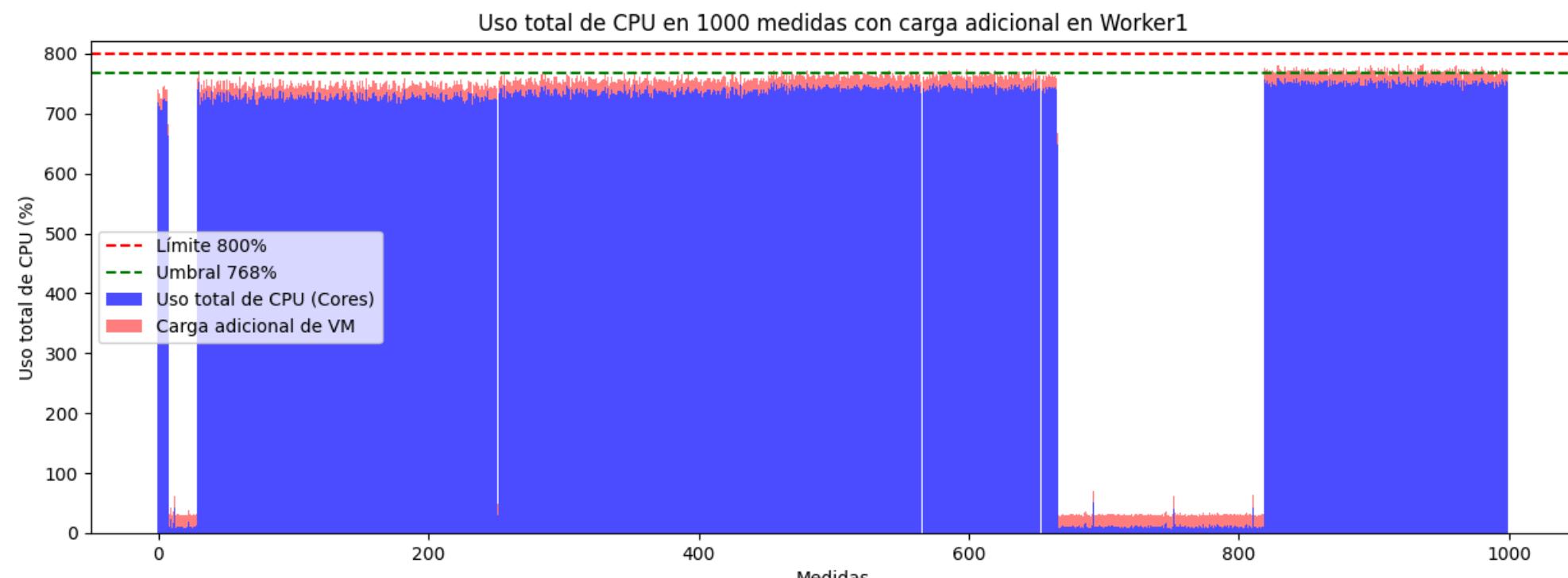
**Tiempo maximo de
espera por aplicación:
100ms**

**En 1 de cada 100
mediciones se acepta
pasar el umbral.**

VM PLACEMENT TEÓRICO

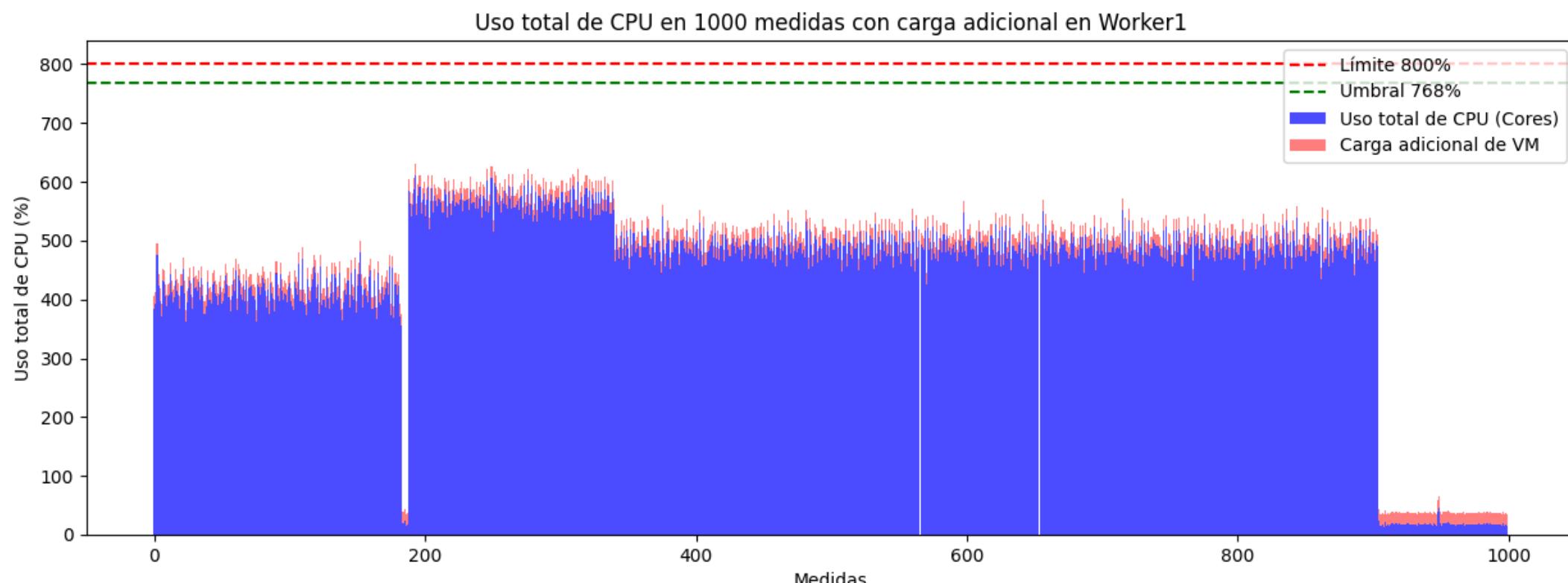


VM PLACEMENT TEÓRICO



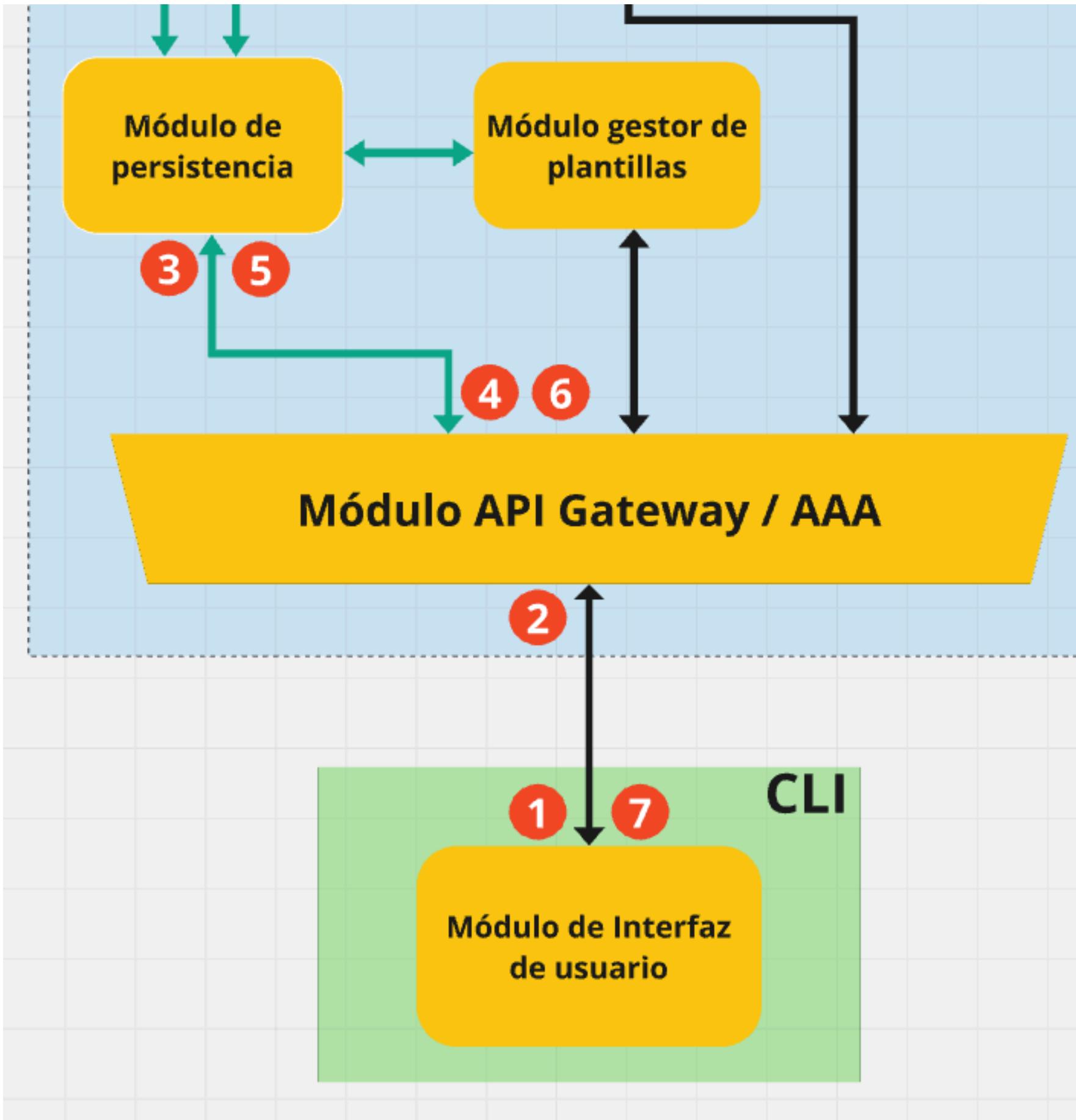
8

$$\left(\sum_{i=1}^n \% \text{ uso de core } i \right) + \text{Demanda CPU nueva VM} \leq \text{Umbral Definido}$$



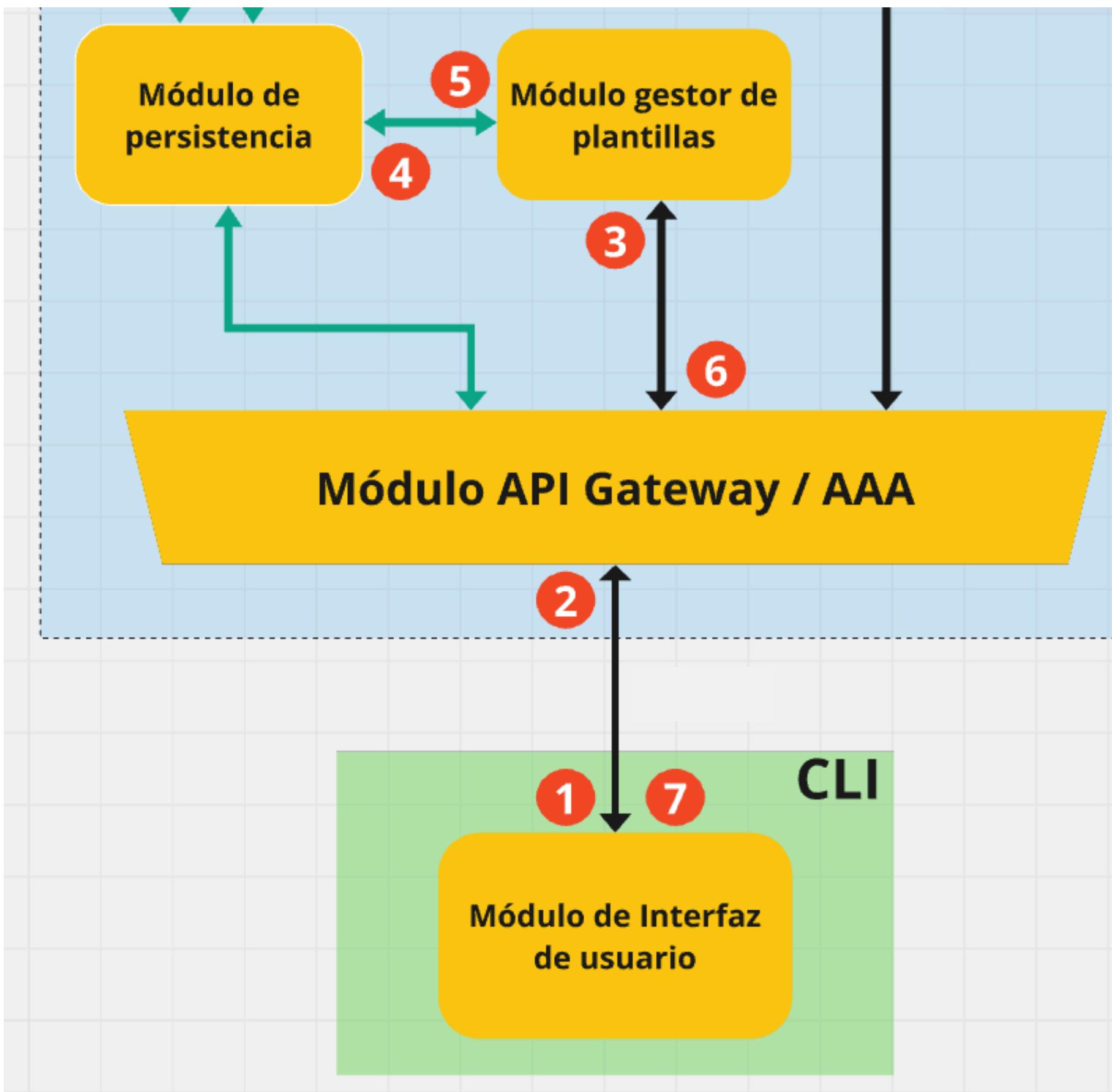
FLUJO DE CASOS DE USO

Autenticación



- 1 El usuario inicia sesión en el CLI con sus credenciales.
- 2 El CLI envía las credenciales al endpoint de autenticación (/login) en el módulo API GATEWAY / AAA.
- 3 El módulo verifica las credenciales consultando la base de datos MongoDB.
- 4 Si las credenciales son válidas (existe el usuario), se genera un json web token.
- 5 Se solicitan datos adicionales del usuario (id, nombre de usuario, rol, jwt) y se envían al CLI.
- 6 El CLI recibe y muestra la confirmación de autenticación junto con los datos del usuario.
- 7 Dependiendo del rol del usuario, se le otorga acceso a comandos específicas de CRUD en el CLI.

Gestión de plantillas



1 El usuario realiza una operación CRUD de plantillas desde el menú del CLI, requiriendo autenticación y autorización previa.

2 El CLI envía una solicitud JSON al módulo API GATEWAY / AAA conteniendo el método HTTP, header X-API-Key, la acción CRUD y los datos de la operación.

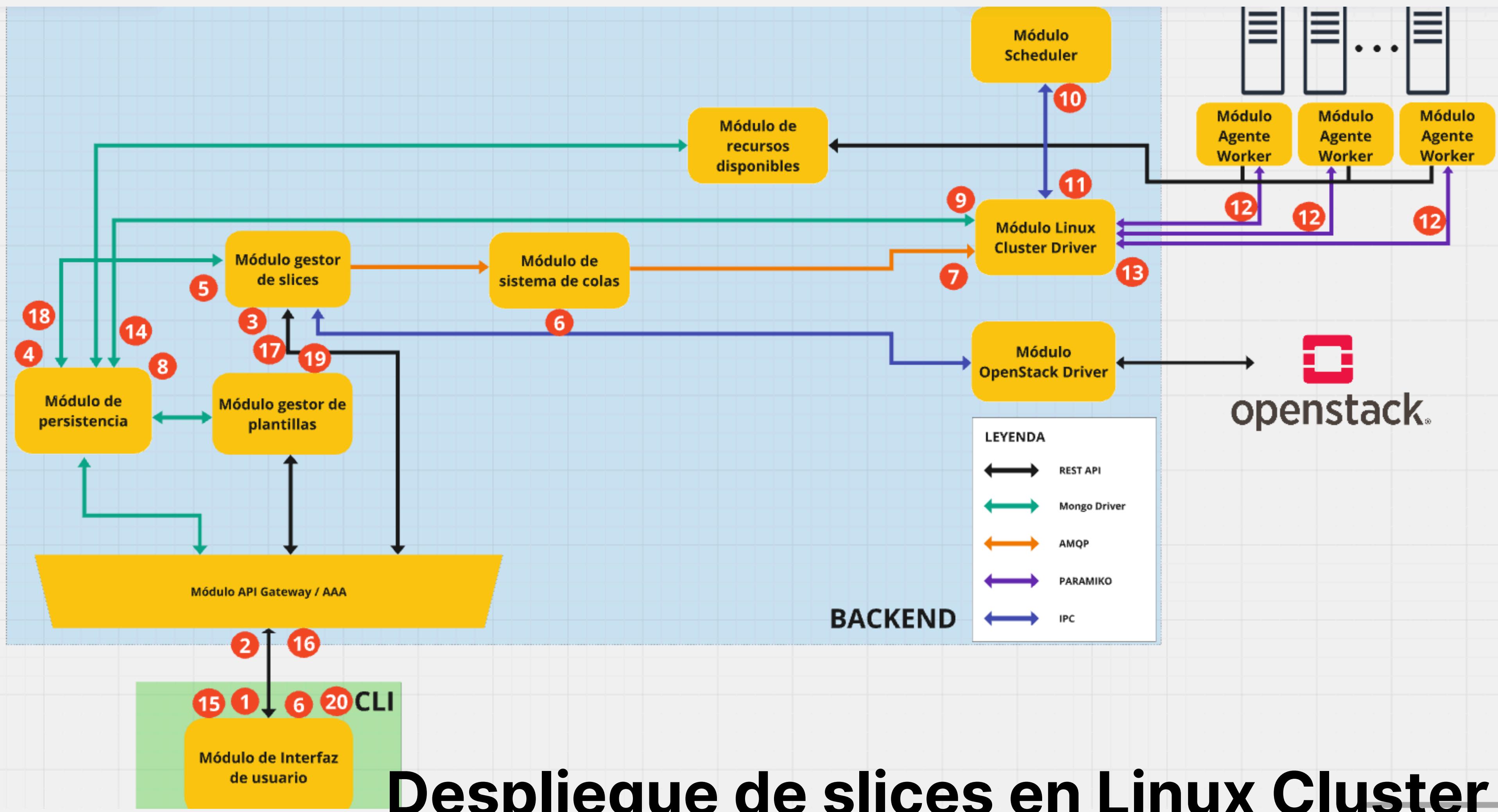
3 El módulo API GATEWAY / AAA redirige la solicitud al gestor de plantillas, según la acción CRUD y el método especificados.

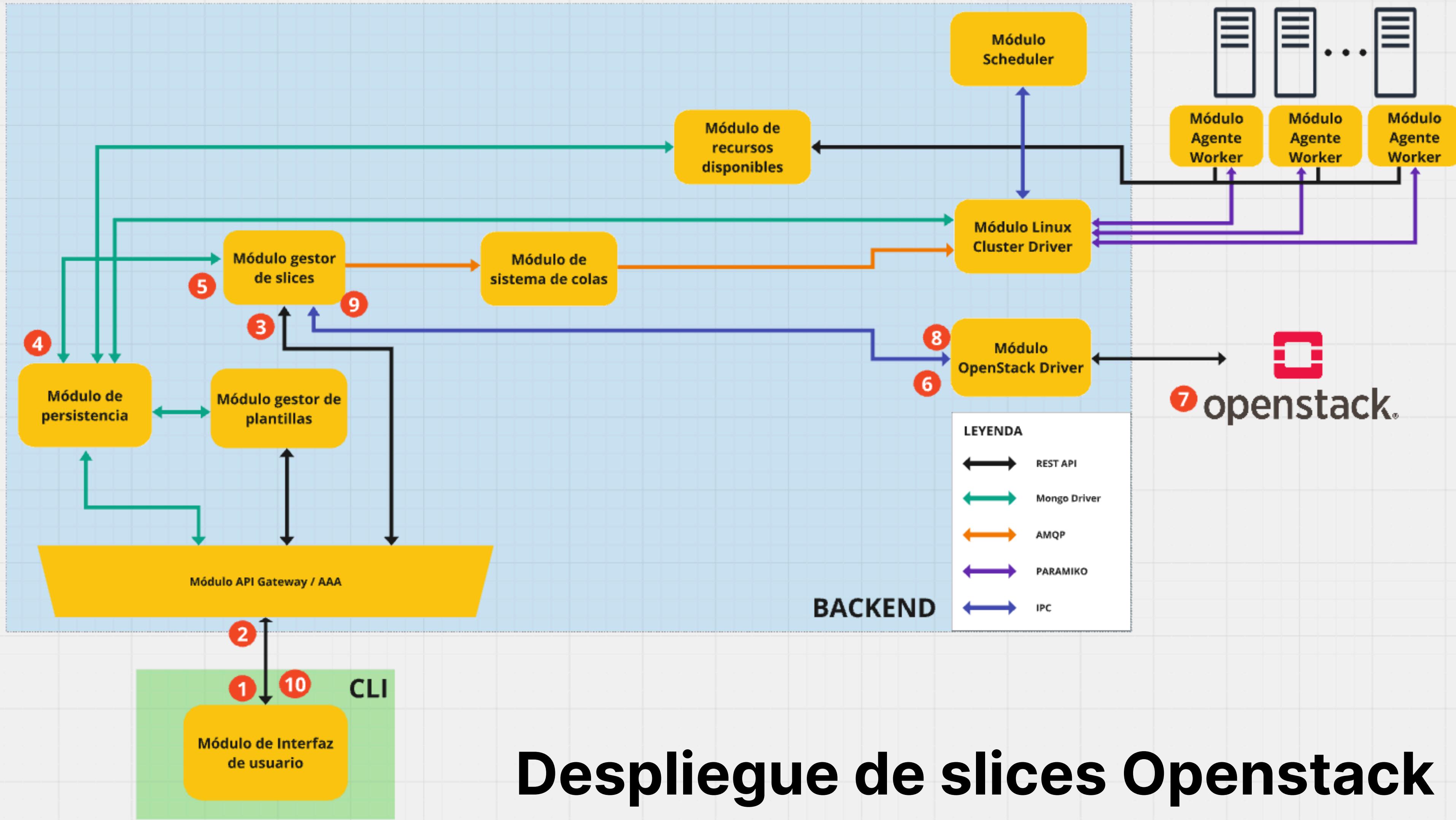
4 El gestor de plantillas procesa la solicitud CRUD, actualizando la base de datos según los datos proporcionados.

5 El gestor de plantillas recibe la respuesta del módulo de persistencia, que puede incluir datos solicitados o confirmación de la operación realizada.

6 El gestor de plantillas responde al módulo API GATEWAY / AAA con los datos obtenidos o la confirmación de la operación en formato JSON.

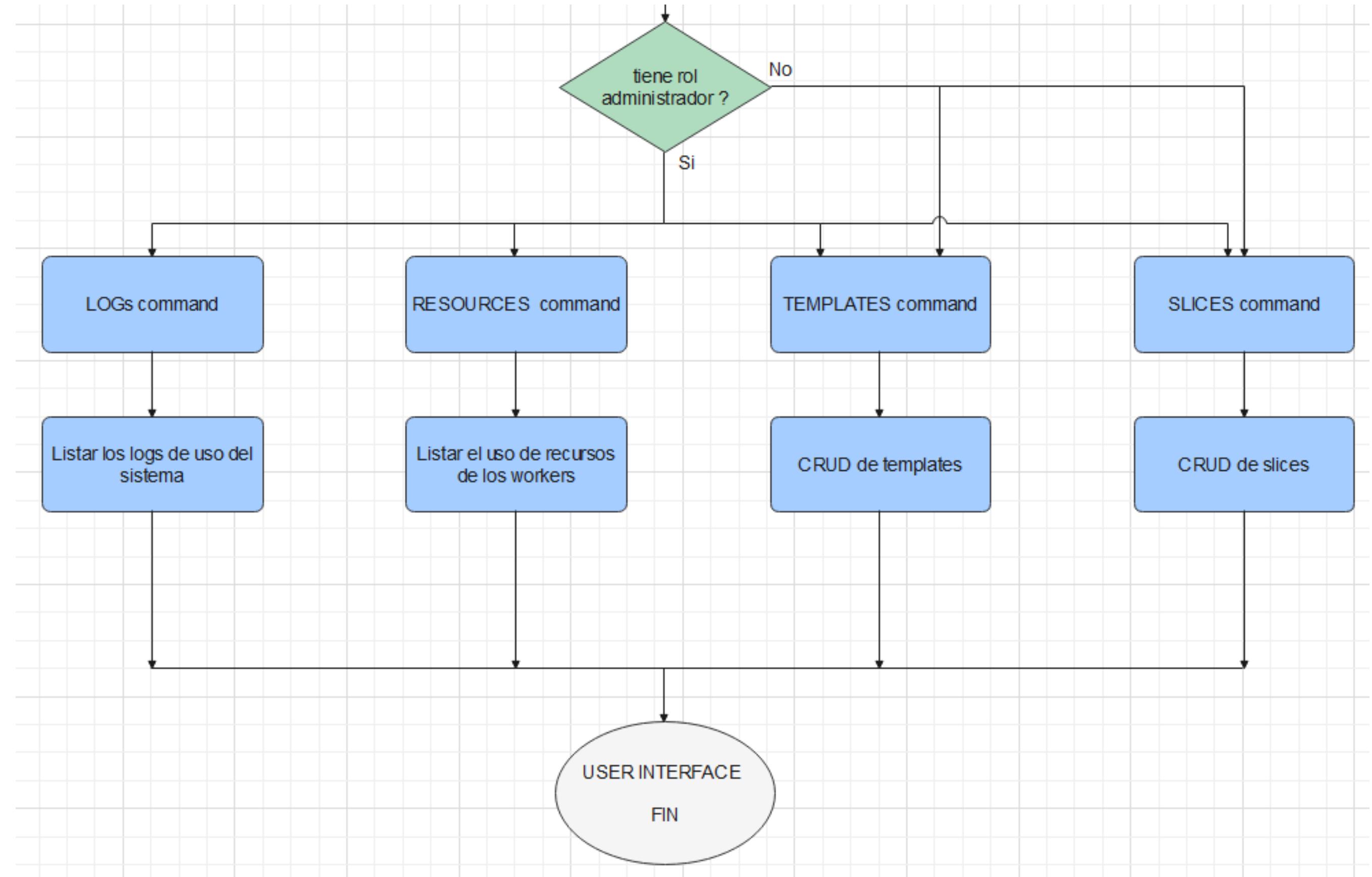
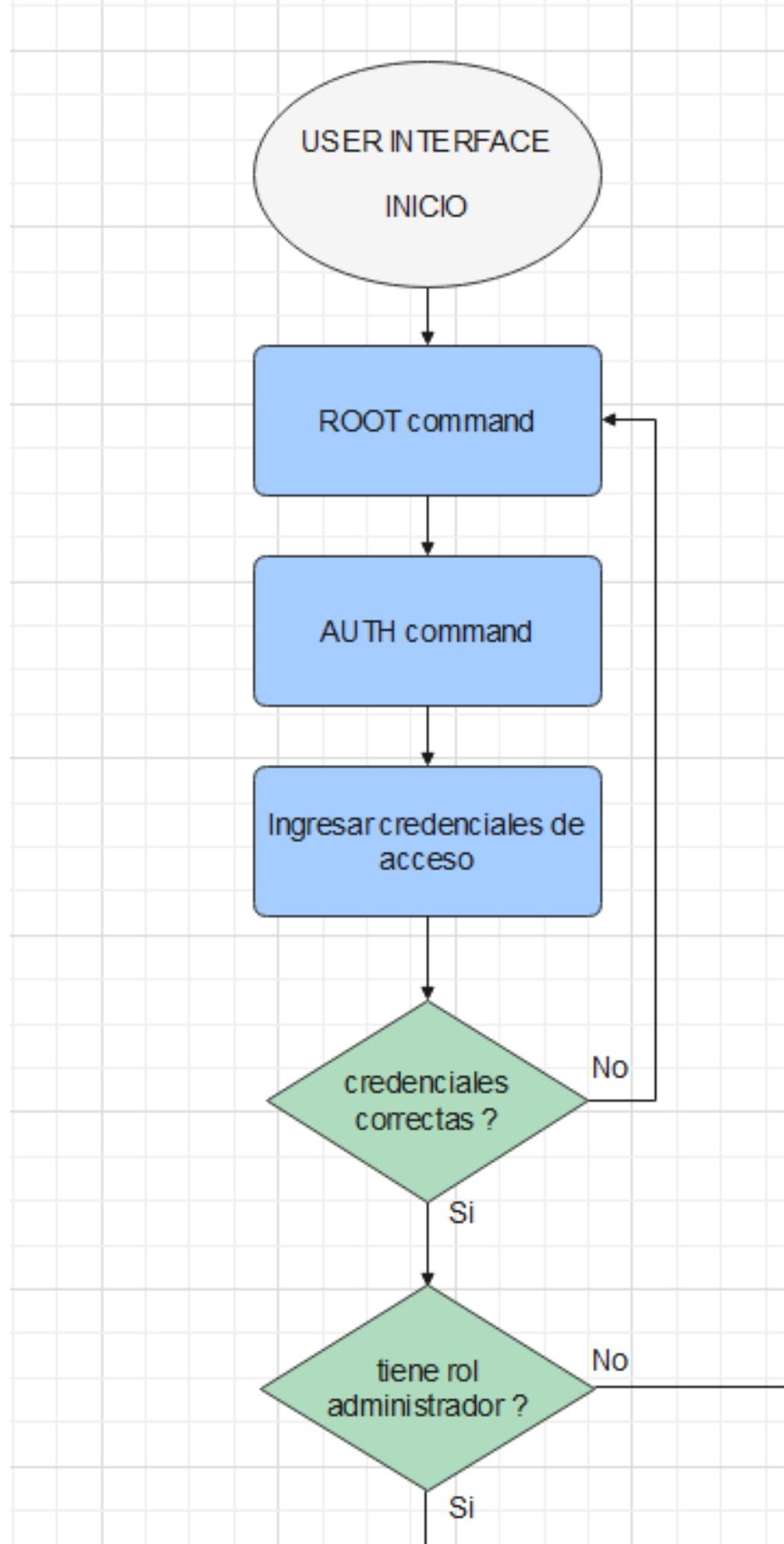
7 El módulo API GATEWAY / AAA redirecciona la respuesta al CLI, que formatea el JSON para mostrar el mensaje en pantalla.



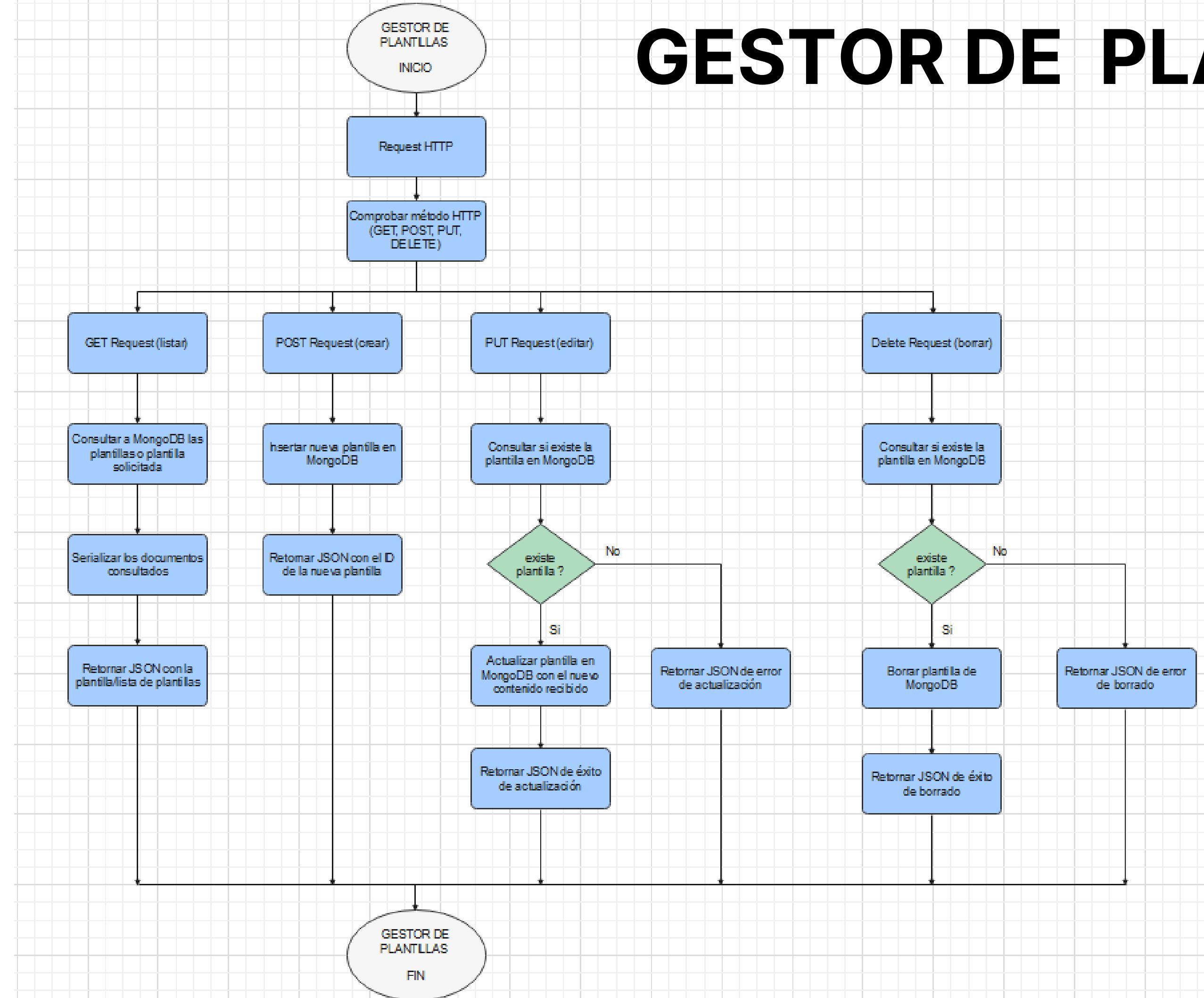


HIGH LEVEL SOFTWARE DESIGN

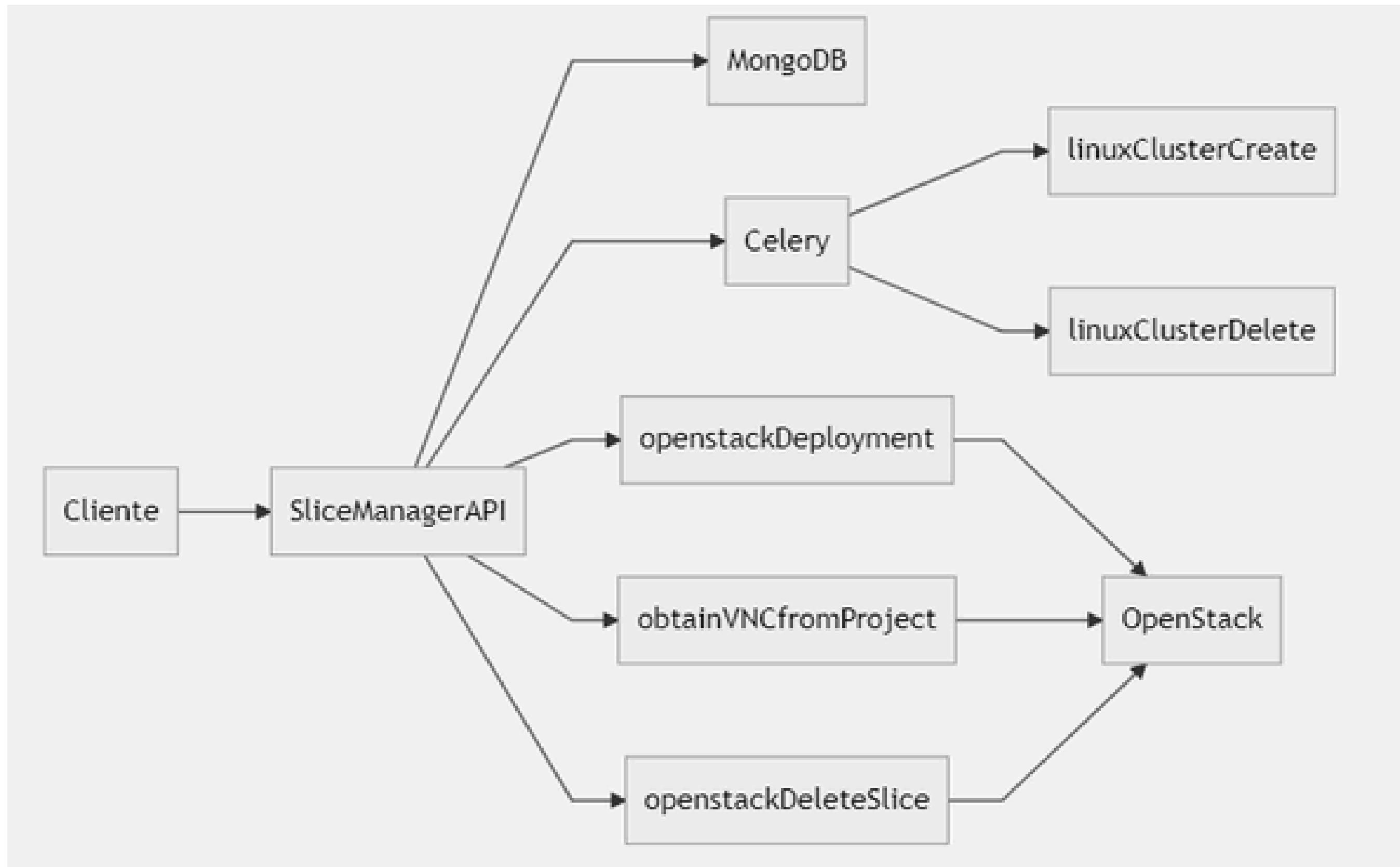
USER INTERFACE (CLI)



GESTOR DE PLANTILLAS



GESTOR DE SLICES



UNIT TESTING

PRUEBAS

CLI

```
rodro@Archbox ~/.../Parzival02/cli-cloud❯ main ./bin/cloud-cli

Cloud cli orchestrator is a command line tool that allows the orchestration
of virtual machine topologies inside a private cloud context

Usage:
  cloud-cli [flags]
  cloud-cli [command]

Available Commands:
  auth      Manage credentials for PUCP private cloud
  help      Help about any command

Flags:
  -h, --help  help for cloud-cli

Use "cloud-cli [command] --help" for more information about a command.
```

PRUEBAS

CLI

```
rodro@Archbox ~/.../Parzival02/cli-cloud $ main ./bin/cloud-cli auth
-----
Manage authentication credentials for the PUCP private cloud platform

Usage:
  cloud-cli auth [flags]
  cloud-cli auth [command]

Available Commands:
  login      Authorize cloud-cli to access the platform
  logout     Revoke access credentials
  password   Change password for the authenticated user

Flags:
  -h, --help  help for auth

Use "cloud-cli auth [command] --help" for more information about a command.
```

PRUEBAS

CLI

```
rodro@Archbox ~/.../Parzival02/cli-cloud $ main ./bin/cloud-cli auth login
>Enter username: admin_user
>Enter password:
>User logged in successfully.
```

```
rodro@Archbox ~/.../Parzival02/cli-cloud $ main ./bin/cloud-cli help
Cloud cli orchestrator is a command line tool that allows the orchestration
of virtual machine topologies inside a private cloud context
```

Usage:
cloud-cli [flags]
cloud-cli [command]

Available Commands:
auth Manage credentials for PUCP private cloud
help Help about any command
logs View system logs
resources View system resources
slices Manage CRUD operations related to slices
templates Manage CRUD operations related to templates
users Manage CRUD operation related to users

Flags:
-h, --help help for cloud-cli

Use "cloud-cli [command] --help" for more information about a command.

```
rodro@Archbox ~/.../Parzival02/cli-cloud $ main cat ~/.cloud-cli.yaml
```

	File: /home/rodro/.cloud-cli.yaml
1	<code>id: 6640550a53c1187a6899a5ab</code>
2	<code>username: regular_user</code>
3	<code>role: user</code>
4	<code>token: eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJleHAiOjE3MTc5NzQ3NDks</code>

PRUEBAS

CLI

```
rodro@Archbox:~/.../Parzival02/cli-cloud$ ./main ./bin/cloud-cli templates
-----
>Available CRUD operations
> (.) List templates
  ( ) List template by id
  ( ) Create template
  ( ) Edit template
  ( ) Delete template
  ( ) Graph template
  ( ) Import template
  ( ) Export template
Press q to Quit.
---
You chose List templates!
```

PRUEBAS

API GATEWAY / AAA

HTTP <http://localhost:4444/login>

POST <http://localhost:4444/login>

Params Authorization Headers (8) **Body** Pre-request Script Tests Settings

None form-data x-www-form-urlencoded raw binary JSON

```
1 {  
2   ... "username": "{$randomUserName}" ,  
3   ... "password": "{$randomPassword}"  
4 }
```

Body Cookies Headers (3) Test Results

401 Unauthorized 118 ms 164 B

Pretty Raw Preview Visualize JSON

```
1 {  
2   "error": "Invalid credentials"  
3 }
```

HTTP <http://localhost:4444/login>

POST <http://localhost:4444/login>

Params Authorization Headers (8) **Body** Pre-request Script Tests Settings

None form-data x-www-form-urlencoded raw binary JSON

```
1 {  
2   ... "username": "admin_user",  
3   ... "password": "josemycoach"  
4 }
```

Body Cookies Headers (3) Test Results

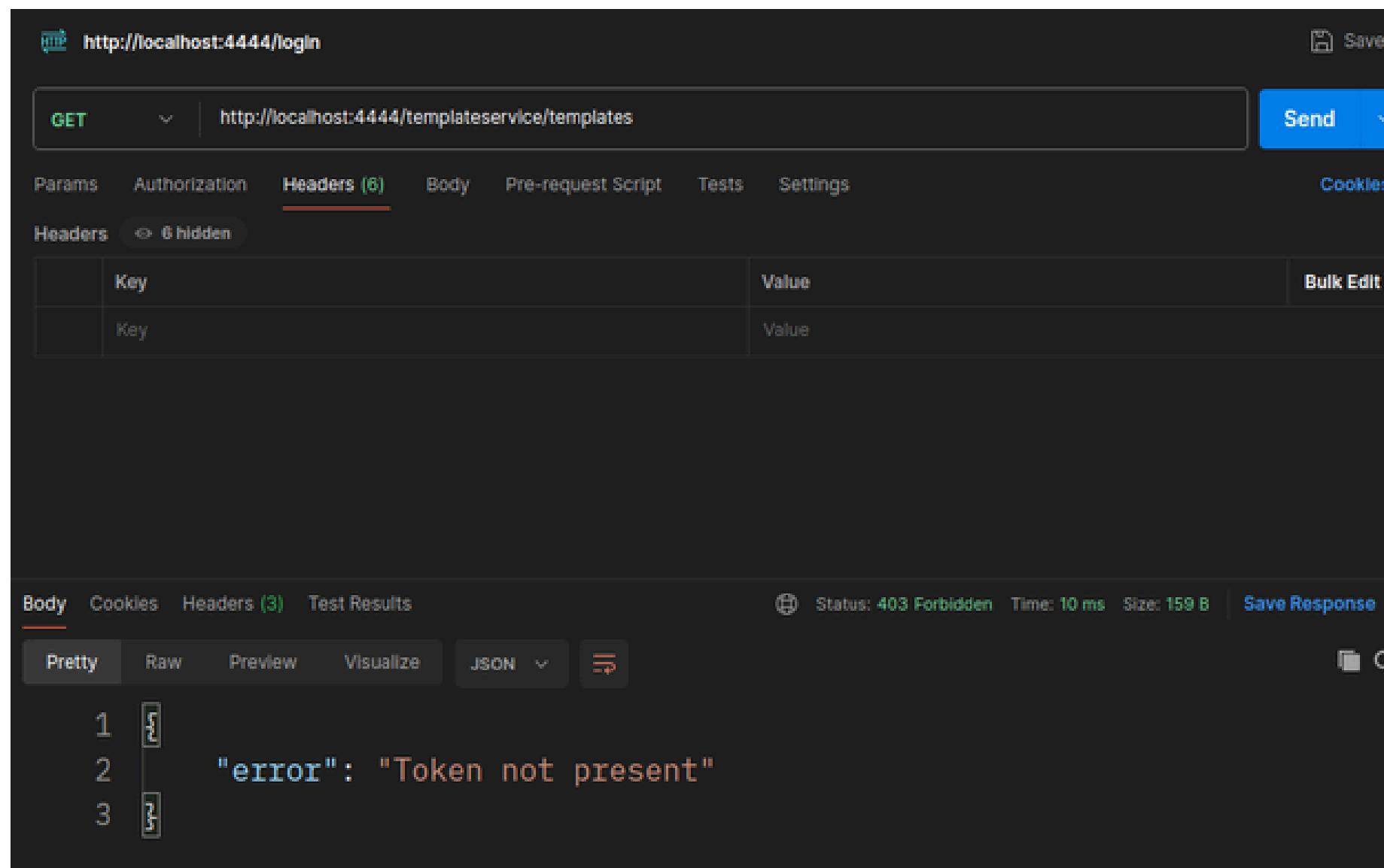
200 OK 246 ms 435 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {  
2   "user": {  
3     "id": "6640550a53c1187a6899a5aa",  
4     "username": "admin_user",  
5     "role": "administrator",  
6     "token": "eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.  
7       eyJleHAiOjE3MTg1MTExNzAsImlkIjo1NjY0MDU1MGE1M2MxM  
8       Tg3YTY4OTlhNWFhIiwicm9sZSI6ImFkbWluXN0cmF0b3IiLC  
9       J1c2VybmFtZSI6ImFkbWluX3VzZXIifQ.  
10      _vdVBL12JXgkz-RPUCBs1oA7Y22F0pkpZtwSV9K6FXo"
```

PRUEBAS

API GATEWAY / AAA



http://localhost:4444/login

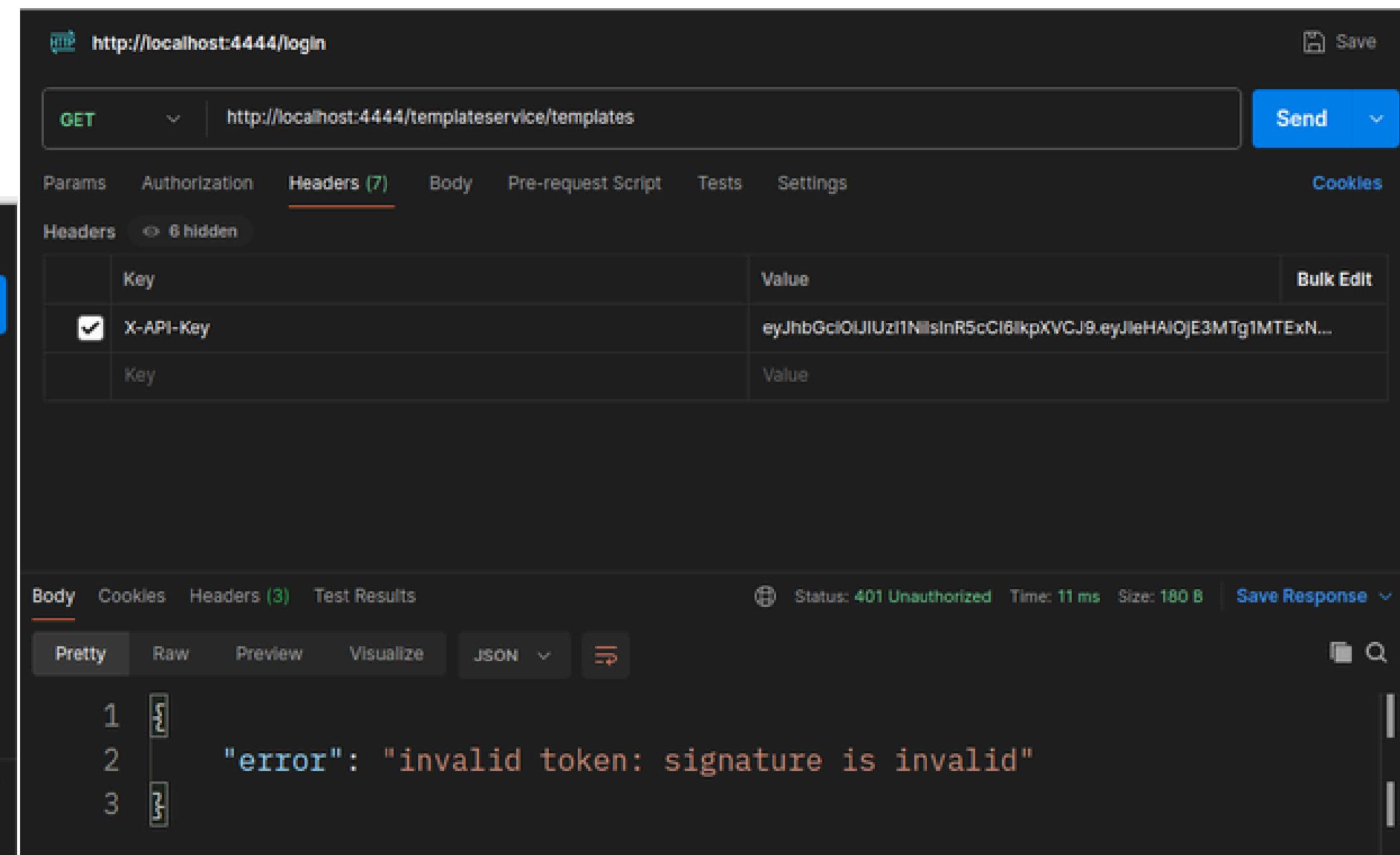
GET http://localhost:4444/templateservice/templates

Headers (6)

Key	Value
Key	Value
Key	Value

Body

```
1 {  
2   "error": "Token not present"  
3 }
```



http://localhost:4444/login

GET http://localhost:4444/templateservice/templates

Headers (7)

Key	Value
X-API-Key	eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJleHAiOiE3MTg1MTExN... <input checked="" type="checkbox"/>
Key	Value

Body

```
1 {  
2   "error": "invalid token: signature is invalid"  
3 }
```

PRUEBAS

API GATEWAY
/ AAA **Api-gateway**

```
[GIN] 2024/07/01 - 06:59:37 | 200 | 12.08531ms | 10.8.0.133 | GET      "/templateservice/templates"
2024/07/01 07:00:03 Request received for /templateservice/templates/668235472411d21efc2a53a8
[GIN] 2024/07/01 - 07:00:03 | 200 | 8.37313ms | 10.8.0.133 | GET      "/templateservice/templates/668235472411d21efc2a53a8"
```

Template manager

```
127.0.0.1 - - [01/Jul/2024 01:59:37] "GET /templates HTTP/1.1" 200 -
127.0.0.1 - - [01/Jul/2024 02:00:03] "GET /templates/668235472411d21efc2a53a8 HTTP/1.1" 200 -

```

Api-gateway

```
[GIN] 2024/07/01 - 07:03:56 | 200 | 21.325333ms | 10.8.0.133 | GET      "/sliceservice/slices"
2024/07/01 07:04:05 Request received for /sliceservice/slices/6682224fa17c42d433848971
[GIN] 2024/07/01 - 07:04:05 | 200 | 8.429353ms | 10.8.0.133 | GET      "/sliceservice/slices/6682224fa17c42d433848971"
```

Slice manager

```
127.0.0.1 - - [01/Jul/2024 02:03:56] "GET /slices HTTP/1.1" 200 -
127.0.0.1 - - [01/Jul/2024 02:04:05] "GET /slices/6682224fa17c42d433848971 HTTP/1.1" 200 -
```

PRUEBAS

GESTOR DE PLANTILLAS

LISTAR PLANTILLAS

GET localhost:5000/templates

Send

Params • Authorization Headers (8) Body • Pre-request Script Tests Settings Cookies

Body Cookies Headers (5) Test Results 200 OK 31 ms 2.05 KB Save Response

Pretty Raw Preview Visualize JSON

```
1 {  
2   "result": "success",  
3   "templates": [  
4     {  
5       "_id": "6640688d53c1187a6899a5c5",  
6       "availability_zone": "zone_estrella",  
7       "deployed": false,  
8       "description": "Template con topología tipo estrella",  
9       "name": "Template Estrella Update Prueba definitiva",  
10      "topology": {  
11        "links": [  
12          {  
13            "source": "central_node",  
14            "target": "peripheral_node1"  
15          },  
16          {  
17            "source": "central_node",  
18            "target": "peripheral_node2"  
19        ]  
20      }  
21    }  
22  ]  
23}  
24
```

LISTAR PLANTILLA POR ID

GET localhost:5000/templates/6640688d53c1187a6899a5c5

Send

Params • Authorization Headers (8) Body • Pre-request Script Tests Settings Cookies

Body Cookies Headers (5) Test Results 200 OK 20 ms 1.9 KB Save Response

Pretty Raw Preview Visualize JSON

```
1 {  
2   "result": "success",  
3   "template": {  
4     "_id": "6640688d53c1187a6899a5c5",  
5     "availability_zone": "zone_estrella",  
6     "deployed": false,  
7     "description": "Template con topología tipo estrella",  
8     "name": "Template Estrella Update Prueba definitiva",  
9     "topology": {  
10       "links": [  
11         {  
12           "source": "central_node",  
13           "target": "peripheral_node1"  
14         },  
15         {  
16           "source": "central_node",  
17           "target": "peripheral_node2"  
18         ]  
19       }  
20     }  
21   }  
22}
```

PRUEBAS

GESTOR DE PLANTILLAS

CREAR PLANTILLA

POST [localhost:5000/templates](#) Send

Params • Authorization Headers (8) Body • Pre-request Script Tests Settings

none form-data x-www-form-urlencoded raw binary JSON

```
1 {  
2   "name": "Template Árbol",  
3   "deployed": false,  
4   "description": "Template con topología tipo árbol",  
5   "vlan_id": "vlan_id_arbol",  
6   "topology": {  
7     "nodes": ["root_node", "child_node1", "child_node2", "child_node3",  
8     ]  
9   }  
10 }
```

Body Cookies Headers (5) Test Results

Pretty Raw Preview Visualize JSON

```
1 {  
2   "id": "66419672d00814ba766b1b7a",  
3   "mensaje": "Plantilla creada correctamente",  
4   "result": "success"  
5 }
```

BORRAR PLANTILLA

DELETE [localhost:5000/templates/66419672d00814ba766b1b7a](#) Send

Params • Authorization Headers (8) Body • Pre-request Script Tests Settings Cook

Body Cookies Headers (5) Test Results

200 OK 20 ms 241 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {  
2   "mensaje": "Plantilla eliminada correctamente",  
3   "result": "success"  
4 }
```



PRUEBAS

GESTOR DE PLANTILLAS

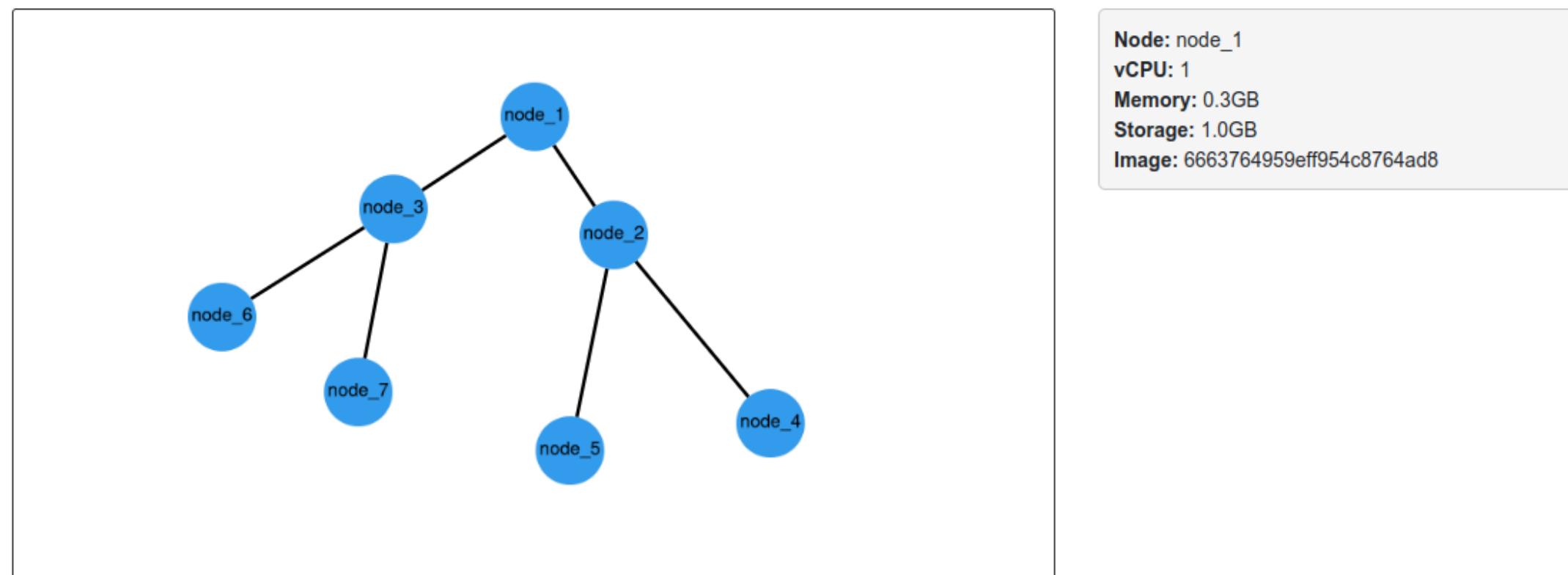
GRAFICAR PLANTILLA



Network Topology

Template Name: Arbolito

Description: Arbol binario de 3 niveles



PRUEBAS

PERSISTENCIA

LISTADO, CREADO, ACTUALIZACIÓN

```
_id: ObjectId('6640688d53c1187a6899a5c5')
user_id : "6640550a53c1187a6899a5a9"
deployed : false
name : "Template Estrella Update Prueba definitiva"
description : "Template con topología tipo estrella"
vlan_id : "vlan_id_estrella"
▶ topology : Object
availability_zone : "zone_estrella"

_id: ObjectId('66419672d00814ba766b1b7a')
name : "Template Árbol"
deployed : false
description : "Template con topología tipo árbol"
vlan_id : "vlan_id_arbol"
▶ topology : Object
availability_zone : "zone_arbol"
```

```
_id: ObjectId('6640688d53c1187a6899a5c5')
user_id : "6640550a53c1187a6899a5a9"
deployed : false
name : "Template Estrella Update Prueba definitiva"
description : "Template con topología tipo estrella"
vlan_id : "vlan_id_estrella"
▶ topology : Object
availability_zone : "zone_estrella"
```

BORRADO

```
_id: ObjectId('6640688d53c1187a6899a5c5')
user_id : "6640550a53c1187a6899a5a9"
deployed : false
name : "Template Árbol"
description : "Template con topología tipo árbol"
vlan_id : "vlan_id_arbol"
▶ topology : Object
availability_zone : "zone_arbol"
```

PRUEBAS

DESPLIEGUE LINUX CLUSTER

```
ubuntu@Worker1:~$ ps aux | grep qemu | grep vlan
root      291980  1.0  1.9 659876 156824 ?        Sl   Jun30   1:57 qemu-system-x86_64
-qemu -enable-kvm -vnc 0.0.0.0:361 -netdev tap,id=nd1,vlan=202-tap,ifname=nd1,vlan=202-tap,script=no,downscript=no -device e1000,netdev=nd1,vlan=202-tap,mac=20:20:20:20:34:89 -daemonize -snapshot cirros-0.6.2-x86_64-disk.img -name nd1
```

The screenshot shows a MongoDB interface with a single document listed. The document has the following fields:

```
_id: ObjectId('66822e89a3403456cb45c88d')
created_at: "2024-07-01T04:20:24.992857147Z"
description: "Arbol binario"
name: "Arbol"
topology: Object
user_id: "6640550a53c1187a6899a5aa"
topology_type: "arbol binario"
availability_zone: "Zone 1"
deployment_type: "linux"
internet: false
template_id: "66821c2213337f06ea618cda"
vlan_id: "202"
```

Below the document, there are buttons for ADD DATA, EXPORT DATA, UPDATE, and DELETE.

The screenshot shows a Postman API request to `10.20.12.162:4444/sliceservice/slices` via POST. The Body tab contains the following JSON payload:

```
{
  "created_at": "2024-07-01T07:46:47.089822208Z",
  "description": "Topologia lineal",
  "name": "Lineal",
  "topology": {
    "links": [
      {
        "link_id": "nd1_nd2",
        "source": "nd1",
        "target": "nd2"
      }
    ]
  }
}
```

The response tab shows a 202 Accepted status with the message: "Deployment initiated for 6682614936173288f889d272 on Linux Cluster", and a task ID: "23c6d6d2-2c0e-4297-a708-d8f6dc9a9961".

PRUEBAS

DESPLIEGUE LINUX CLUSTER

HTTP 10.20.12.162:4444/sliceservice/tasks/23c6d6d2-2c0e-4297-a708-d8f6dc9a9961

Save

GET 10.20.12.162:4444/sliceservice/tasks/23c6d6d2-2c0e-4297-a708-d8f6dc9a9961 Send

Params Authorization Headers (7) Body Pre-request Script Tests Settings Cookies

Type No Auth

This request does not use any authorization. [Learn more about authorization](#)

Body Cookies Headers (4) Test Results

200 OK 121 ms 395 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   "message": "Task completed successfully.",
3   "result": {
4     "message": "Slice with slice id
5       6682614936173288f889d272 deployed
6       successfully on Linux Cluster"
7   },
8   "status": "SUCCESS",
9   "task_id": "23c6d6d2-2c0e-4297-a708-d8f6dc9a9961"
}
```

[deployment_type:"linux"]

ADD DATA EXPORT DATA UPDATE DELETE

```
_id: ObjectId('66822e89a3403456cb45c88d')
created_at: "2024-07-01T04:20:24.992857147Z"
description: "Arbol binario"
name: "Arbol"
topology: Object
user_id: "6640550a53c1187a6899a5aa"
topology_type: "arbol binario"
availability_zone: "Zone 1"
deployment_type: "linux"
internet: false
template_id: "66821c2213337f06ea618cda"
vlan_id: "202"

_id: ObjectId('6682614936173288f889d272')
created_at: "2024-07-01T07:46:47.089822208Z"
description: "Topologia lineal"
name: "Lineal"
topology: Object
links: Array (2)
nodes: Array (3)
0: Object
node_id: "nd1"
name: "node_1"
image: "6663764959eff954c8764adc"
security_rules: Array (1)
flavor: Object
process: "333281"
vnc: "6381"
worker: "10.0.0.30"
1: Object
2: Object
user_id: "6640550a53c1187a6899a5aa"
topology_type: "lineal"
availability_zone: "Zone 1"
deployment_type: "linux"
internet: false
template_id: "66825ee7efd68e9b563d1a49"
vlan_id: "256"
```

```
ubuntu@Worker1:~$ ps aux | grep qemu | grep vlan
root      291980  0.9 1.9 659876 156824 ?        S1    Jun30   2:06 qemu-system-x86_64 -enable-kvm -vnc 0.0.0.0:361 -netdev tap,id=nd1vl
an202-tap,ifname=nd1vl
root      333281 23.5 1.9 586144 156856 ?        S1    02:57   0:55 qemu-system-x86_64 -enable-kvm -vnc 0.0.0.0:481 -netdev tap,id=nd1vl
an256-tap,ifname=nd1vl
cirros-0.6.2-x86_64-disk.img -name nd1
```

PRUEBAS

DESPLIEGUE LINUX CLUSTER

```
[2024-07-01 02:57:01,077: WARNING/ForkPoolWorker-4] sudo -S bash vm_script.sh nd1 br-vlan 256 6381
[2024-07-01 02:57:01,094: INFO/ForkPoolWorker-4] Connected (version 2.0, client OpenSSH_8.2p1)
[2024-07-01 02:57:01,138: INFO/ForkPoolWorker-4] Authentication (password) successful!
[2024-07-01 02:57:01,993: INFO/ForkPoolWorker-4] 10.0.0.40 is assigned nodes: 2
[2024-07-01 02:57:01,993: WARNING/ForkPoolWorker-4] sudo -S bash vm_script.sh nd2 br-vlan 256 6308
[2024-07-01 02:57:02,009: INFO/ForkPoolWorker-4] Connected (version 2.0, client OpenSSH_8.2p1)
[2024-07-01 02:57:02,050: INFO/ForkPoolWorker-4] Authentication (password) successful!
[2024-07-01 02:57:02,896: INFO/ForkPoolWorker-4] 10.0.0.50 is assigned nodes: 3
[2024-07-01 02:57:02,896: WARNING/ForkPoolWorker-4] sudo -S bash vm_script.sh nd3 br-vlan 256 6330
[2024-07-01 02:57:02,914: INFO/ForkPoolWorker-4] Connected (version 2.0, client OpenSSH_8.2p1)
[2024-07-01 02:57:02,956: INFO/ForkPoolWorker-4] Authentication (password) successful!
[2024-07-01 02:57:03,798: WARNING/ForkPoolWorker-4] sudo -S bash obtain_worker.sh 256
[2024-07-01 02:57:03,814: INFO/ForkPoolWorker-4] Connected (version 2.0, client OpenSSH_8.2p1)
[2024-07-01 02:57:03,854: INFO/ForkPoolWorker-4] Authentication (password) successful!
[2024-07-01 02:57:04,595: WARNING/ForkPoolWorker-4] ['ubuntu', '[sudo] password for ubuntu: ', 'nd1 333281 6381 10.0.0.30']
[2024-07-01 02:57:04,595: INFO/ForkPoolWorker-4] Node nd1 is assigned to 10.0.0.30. Process is 333281 and vnc port is 6381
[2024-07-01 02:57:04,595: WARNING/ForkPoolWorker-4] sudo -S bash obtain_worker.sh 256
[2024-07-01 02:57:04,612: INFO/ForkPoolWorker-4] Connected (version 2.0, client OpenSSH_8.2p1)
[2024-07-01 02:57:04,650: INFO/ForkPoolWorker-4] Authentication (password) successful!
[2024-07-01 02:57:05,397: WARNING/ForkPoolWorker-4] ['ubuntu', '[sudo] password for ubuntu: ', 'nd2 333883 6308 10.0.0.40']
[2024-07-01 02:57:05,398: INFO/ForkPoolWorker-4] Node nd2 is assigned to 10.0.0.40. Process is 333883 and vnc port is 6308
[2024-07-01 02:57:05,398: WARNING/ForkPoolWorker-4] sudo -S bash obtain_worker.sh 256
[2024-07-01 02:57:05,415: INFO/ForkPoolWorker-4] Connected (version 2.0, client OpenSSH_8.2p1)
[2024-07-01 02:57:05,456: INFO/ForkPoolWorker-4] Authentication (password) successful!
[2024-07-01 02:57:06,200: WARNING/ForkPoolWorker-4] ['ubuntu', '[sudo] password for ubuntu: ', 'nd3 342111 6330 10.0.0.50']
[2024-07-01 02:57:06,200: INFO/ForkPoolWorker-4] Node nd3 is assigned to 10.0.0.50. Process is 342111 and vnc port is 6330
```

PRUEBAS

BORRADO LINUX CLUSTER

HTTP 10.20.12.162:4444/sliceservice/slices/6682614936173288f889d272

DELETE 10.20.12.162:4444/sliceservice/slices/6682614936173288f889d272

Send

Params Authorization Headers (7) Body Pre-request Script Tests Settings Cookies

Headers (6 hidden)

Key	Value
X-API-Key	eyJhbGciOiJIUzI1NilsInR5cCI6IkpxVCJ9.eyJleHAiOjE3MTk
Key	Value

Body Cookies Headers (4) Test Results

Pretty Raw Preview Visualize JSON

```
1 {  
2   "message": "Delete workflow initiated for  
3       6682614936173288f889d272 on Linux Cluster",  
4   "task_id": "51cc7908-329e-4ebb-91c0-51bf4b663740"  
5 }
```

HTTP 10.20.12.162:4444/sliceservice/tasks/51cc7908-329e-4ebb-91c0-51bf4b663740

GET 10.20.12.162:4444/sliceservice/tasks/51cc7908-329e-4ebb-91c0-51bf4b663740

Send

Params Authorization Headers (7) Body Pre-request Script Tests Settings Cookies

Headers (6 hidden)

Key	Value
X-API-Key	eyJhbGciOiJIUzI1NilsInR5cCI6IkpxVCJ9.eyJleHAiOjE3MTk
Key	Value

Body Cookies Headers (4) Test Results

Pretty Raw Preview Visualize JSON

```
1 {  
2   "message": "Task completed successfully.",  
3   "result": {  
4     "message": "Slice with slice id  
5         6682614936173288f889d272 deleted  
6         successfully on Linux Cluster"  
7   },  
8   "status": "SUCCESS",  
9   "task_id": "51cc7908-329e-4ebb-91c0-51bf4b663740"  
10 }
```

PRUEBAS

BORRADO LINUX CLUSTER

```
ubuntu@Worker1:~$ ps aux | grep 333281
ubuntu    333948  0.0  0.0    8160   724 pts/4      S+     03:30    0:00 grep --color=auto 333281
ubuntu@Worker1:~$ 
```

```
[2024-07-01 03:23:07,904: INFO/ForkPoolWorker-4] Starting to delete VM slice 6682614936173288f889d272 on Linux Cluster
[2024-07-01 03:23:07,904: WARNING/ForkPoolWorker-4] bash implement_orchestrator/delete_headnode.sh 256 br-vlan
[2024-07-01 03:23:08,040: INFO/ForkPoolWorker-4] Connected (version 2.0, client OpenSSH_8.2p1)
[2024-07-01 03:23:08,109: INFO/ForkPoolWorker-4] Authentication (password) successful!
[2024-07-01 03:23:08,957: INFO/ForkPoolWorker-4] Node nd1 assigned to 10.0.0.30 with process 333281 has been deleted
[2024-07-01 03:23:08,981: INFO/ForkPoolWorker-4] Connected (version 2.0, client OpenSSH_8.2p1)
[2024-07-01 03:23:09,021: INFO/ForkPoolWorker-4] Authentication (password) successful!
[2024-07-01 03:23:09,854: INFO/ForkPoolWorker-4] Node nd2 assigned to 10.0.0.40 with process 333883 has been deleted
[2024-07-01 03:23:09,880: INFO/ForkPoolWorker-4] Connected (version 2.0, client OpenSSH_8.2p1)
[2024-07-01 03:23:09,924: INFO/ForkPoolWorker-4] Authentication (password) successful!
[2024-07-01 03:23:10,774: INFO/ForkPoolWorker-4] Node nd3 assigned to 10.0.0.50 with process 342111 has been deleted
[2024-07-01 03:23:10,778: INFO/ForkPoolWorker-4] Slice with slice id 6682614936173288f889d272 deleted successfully on l
[2024-07-01 03:23:10,778: WARNING/ForkPoolWorker-4] Slice borrdo exitosamente.
```

PRUEBAS

LOGS LINUX CLUSTER

```
▼ {
  ▶ "_id": {...},
  ▶ "task_id": "23c6d6d2-2c0e-4297-a708-d8f6dc9a9961",
  ▶ "timestamp": {...},
  ▶ "message": "2024-07-01 02:56:57,439 - task_23c6d6d2-2c0e-4297-a708-d8f6dc9a9961 - INFO - Starting deployment of VM slice 6682614936173288f889d272 on Linux Cluster",
  ▶ "level": "INFO"
}

▼ {
  ▶ "_id": {...},
  ▶ "task_id": "23c6d6d2-2c0e-4297-a708-d8f6dc9a9961",
  ▶ "timestamp": {...},
  ▶ "message": "2024-07-01 02:57:01,077 - task_23c6d6d2-2c0e-4297-a708-d8f6dc9a9961 - INFO - 10.0.0.30 is assigned nodes: 1",
  ▶ "level": "INFO"
}

▼ {
  ▶ "_id": {...},
  ▶ "task_id": "23c6d6d2-2c0e-4297-a708-d8f6dc9a9961",
  ▶ "timestamp": {...},
  ▶ "message": "2024-07-01 02:57:01,993 - task_23c6d6d2-2c0e-4297-a708-d8f6dc9a9961 - INFO - 10.0.0.40 is assigned nodes: 2",
  ▶ "level": "INFO"
}

▼ {
  ▶ "_id": {...},
  ▶ "task_id": "23c6d6d2-2c0e-4297-a708-d8f6dc9a9961",
  ▶ "timestamp": {...},
  ▶ "message": "2024-07-01 02:57:02,896 - task_23c6d6d2-2c0e-4297-a708-d8f6dc9a9961 - INFO - 10.0.0.50 is assigned nodes: 3",
  ▶ "level": "INFO"
}
```

PRUEBAS

LOGS LINUX CLUSTER

```
▼ [
  ▶ "_id": {[]},
  ▶ "task_id": "23c6d6d2-2c0e-4297-a708-d8f6dc9a9961",
  ▶ "timestamp": {[]},
  ▶ "message": "2024-07-01 02:57:04,595 - task_23c6d6d2-2c0e-4297-a708-d8f6dc9a9961 - INFO - Node nd1 is assigned to 10.0.0.30. Process is 333281 and vnc port is 6381",
  ▶ "level": "INFO"
}

▼ [
  ▶ "_id": {[]},
  ▶ "task_id": "23c6d6d2-2c0e-4297-a708-d8f6dc9a9961",
  ▶ "timestamp": {[]},
  ▶ "message": "2024-07-01 02:57:05,398 - task_23c6d6d2-2c0e-4297-a708-d8f6dc9a9961 - INFO - Node nd2 is assigned to 10.0.0.40. Process is 333883 and vnc port is 6308",
  ▶ "level": "INFO"
}

▼ [
  ▶ "_id": {[]},
  ▶ "task_id": "23c6d6d2-2c0e-4297-a708-d8f6dc9a9961",
  ▶ "timestamp": {[]},
  ▶ "message": "2024-07-01 02:57:06,200 - task_23c6d6d2-2c0e-4297-a708-d8f6dc9a9961 - INFO - Node nd3 is assigned to 10.0.0.50. Process is 342111 and vnc port is 6330",
  ▶ "level": "INFO"
]

▼ [
  ▶ "_id": {[]},
  ▶ "task_id": "23c6d6d2-2c0e-4297-a708-d8f6dc9a9961",
  ▶ "timestamp": {[]},
  ▶ "message": "2024-07-01 02:57:06,205 - task_23c6d6d2-2c0e-4297-a708-d8f6dc9a9961 - INFO - Slice with slice id 6682614936173288f889d272 deployed successfully on Linux Cluster",
  ▶ "level": "INFO"
]
```

PRUEBAS

LOGS LINUX CLUSTER

```
▶  "_id": {...},
  "task_id": "51cc7908-329e-4ebb-91c0-51bf4b663740",
▶  "timestamp": {...},
  "message": "2024-07-01 03:23:07,904 - task_51cc7908-329e-4ebb-91c0-51bf4b663740 - INFO - Starting to delete VM slice 6682614936173288f889d272 on Linux Cluster",
  "level": "INFO"
}

{
  "_id": {...},
  "task_id": "51cc7908-329e-4ebb-91c0-51bf4b663740",
  "timestamp": {...},
  "message": "2024-07-01 03:23:08,957 - task_51cc7908-329e-4ebb-91c0-51bf4b663740 - INFO - Node nd1 assigned to 10.0.0.30 with process 333281 has been deleted",
  "level": "INFO"
}

{
  "_id": {...},
  "task_id": "51cc7908-329e-4ebb-91c0-51bf4b663740",
  "timestamp": {...},
  "message": "2024-07-01 03:23:09,854 - task_51cc7908-329e-4ebb-91c0-51bf4b663740 - INFO - Node nd2 assigned to 10.0.0.40 with process 333883 has been deleted",
  "level": "INFO"
}

{
  "_id": {...},
  "task_id": "51cc7908-329e-4ebb-91c0-51bf4b663740",
  "timestamp": {...},
  "message": "2024-07-01 03:23:10,774 - task_51cc7908-329e-4ebb-91c0-51bf4b663740 - INFO - Node nd3 assigned to 10.0.0.50 with process 342111 has been deleted",
  "level": "INFO"
}

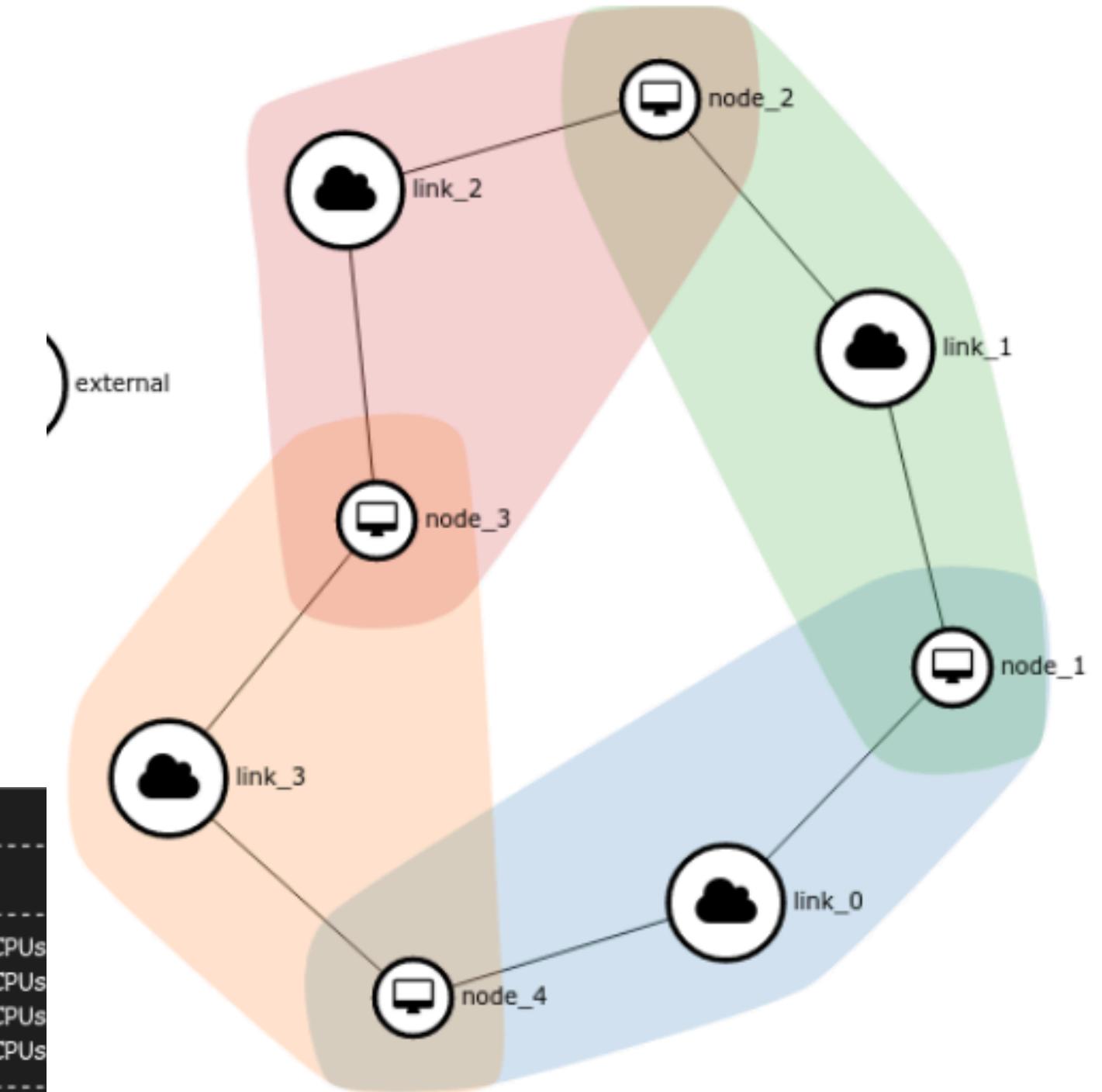
{
  "_id": {...},
  "task_id": "51cc7908-329e-4ebb-91c0-51bf4b663740",
  "timestamp": {...},
  "message": "2024-07-01 03:23:10,778 - task_51cc7908-329e-4ebb-91c0-51bf4b663740 - INFO - Slice with slice id 6682614936173288f889d272 deleted successfully on Linux Cluster",
  "level": "INFO"
}
```

PRUEBAS

DESPLIEGUE OPENSTACK

```
rodro@Archbox:~/.../venv/venv> source bin/activate
rodro@Archbox:~[v] 3.12.4~/.../venv/venv> python deploy4.py
link_0 created successfully with ID 17327e38-fd20-49fa-92a4-f680abf41f9d
link_1 created successfully with ID c38631c4-b52c-47d2-a6b5-bbfe2f40f19b
link_2 created successfully with ID c85cf140-a0a1-44ac-b744-430fe60e84bd
link_3 created successfully with ID 563a57ca-eae5-4e3c-a0da-2d4365b7bcf4
Instance node_1 created successfully with ID b07188e3-7fb3-4736-995d-aa94a01f1a8b
Instance node_2 created successfully with ID 9854cf89-8c1f-4854-b167-45cddd88a703
Instance node_3 created successfully with ID cdd6cbcfc-db63-4b8e-a78e-c8577995f3a3
Instance node_4 created successfully with ID 86895cab-6104-488d-ada7-8025ccb60769
Ring network created.
```

```
root@HeadNode:~# openstack server list --project prueba
+-----+-----+-----+-----+-----+-----+
| ID      | Name   | Status | Networks          | Image   | Flavor |
+-----+-----+-----+-----+-----+-----+
| 86895cab-6104-488d-ada7-8025ccb60769 | node_4 | ACTIVE | link_0=10.0.0.104; link_3=10.0.3.124 | cirros | 256MBRAM_1VCPU |
| cdd6cbcfc-db63-4b8e-a78e-c8577995f3a3 | node_3 | ACTIVE | link_2=10.0.2.93; link_3=10.0.3.70    | cirros | 256MBRAM_1VCPU |
| 9854cf89-8c1f-4854-b167-45cddd88a703 | node_2 | ACTIVE | link_1=10.0.1.80; link_2=10.0.2.87    | cirros | 256MBRAM_1VCPU |
| b07188e3-7fb3-4736-995d-aa94a01f1a8b | node_1 | ACTIVE | link_0=10.0.0.92; link_1=10.0.1.242 | cirros | 256MBRAM_1VCPU |
+-----+-----+-----+-----+-----+-----+
root@HeadNode:~# openstack network list --project prueba
+-----+-----+
| ID      | Name   | Subnets           |
+-----+-----+
| 17327e38-fd20-49fa-92a4-f680abf41f9d | link_0 | ce23e57b-07c6-4bee-99ed-4e5f129c2998 |
| 563a57ca-eae5-4e3c-a0da-2d4365b7bcf4 | link_3 | 7b61869f-206e-4b87-b0f9-20f958e47188 |
| c38631c4-b52c-47d2-a6b5-bbfe2f40f19b | link_1 | dcd20648-060e-48d6-93fb-00c8506ef248 |
| c85cf140-a0a1-44ac-b744-430fe60e84bd | link_2 | 69ade9ab-7fb1-424a-a548-355b62d5d695 |
+-----+-----+
```



PRUEBAS

DESPLIEGUE OPENSTACK - VNC URLs

```
Servidor: node_4, VNC URL: http://10.20.12.162:6080/vnc_auto.html?path=%3Ftoken%3D82e2ef76-441b-4225-9468-3162e2f64ebd
Servidor: node_3, VNC URL: http://10.20.12.162:6080/vnc_auto.html?path=%3Ftoken%3D19800953-b2e6-4c46-9ca7-3d3e4328c147
Servidor: node_2, VNC URL: http://10.20.12.162:6080/vnc_auto.html?path=%3Ftoken%3D02c507ed-71c5-4c12-a29d-7188e75bbc60
Servidor: node_1, VNC URL: http://10.20.12.162:6080/vnc_auto.html?path=%3Ftoken%3Dc2205ea6-5bd3-4158-b350-a9fd98fa1bc1
VNCs of project id 6dd25f2248614cb8998389a635c9bf8b obtained successfully
```



No es seguro 10.20.12.162:6080/vnc_auto.html?path=%3Ftoken%3D82e2ef76-441b-4225-9468-3162e2f64ebd

```
[ 3.410498] BIOS EDD facility v0.16 2004-Jun-25, 0 devices found
[ 3.427620] EDD information not available.
[ 3.444781] Freeing unused kernel memory: 1480K (ffffffffff81f42000 - ffffffff820b1000)
[ 3.468063] Write protecting the kernel read-only data: 14336k
[ 3.485422] Freeing unused kernel memory: 1860K (fffff880000182f000 - fffff8800001a00000)
[ 3.509930] Freeing unused kernel memory: 160K (fffff8000001dd6000 - fffff8000001e00000)

further output written to /dev/ttys0
[ 4.397366] random: dd urandom read with 23 bits of entropy available
[ 226.241977] random: nonblocking pool is initialized

login as 'cirros' user. default password: 'gocubsgo'. use 'sudo' for root.
cirros login:
login as 'cirros' user. default password: 'gocubsgo'. use 'sudo' for root.
cirros login:
login as 'cirros' user. default password: 'gocubsgo'. use 'sudo' for root.
cirros login:
login as 'cirros' user. default password: 'gocubsgo'. use 'sudo' for root.
cirros login:
login as 'cirros' user. default password: 'gocubsgo'. use 'sudo' for root.
cirros login:
```

PRUEBAS

AGENTE WORKER - INFORMACION DE RECURSOS

```
INFO: 10.0.0.30:46308 - "POST /data HTTP/1.1" 200 OK
Received data: {'worker3': '10.0.0.50', 'Core0(%)': 93.0, 'Core1(%)': 96.0, 'Core2(%)': 92.0, 'Core3(%)': 94.0, 'Core4(%)': 95.0, 'Core5(%)': 94.0, 'Core6(%)': 94.0, 'Core7(%)': 97.0, 'MemoriaUsada(Mb)': 1437.1, 'MemoriaDisponible(Mb)': 6573.2, 'MemoriaTotal(Mb)': 8330.3, 'AlmacenamientoUsado(Gb)': 3.4, 'AlmacenamientoUsado(%)': 18, 'AlmacenamientoTotal(Gb)': 19.2, 'timestamp': '30-06-2024 19:47:32'}
INFO: 10.0.0.50:58650 - "POST /data HTTP/1.1" 200 OK
Received data: {'worker2': '10.0.0.40', 'Core0(%)': 92.0, 'Core1(%)': 93.0, 'Core2(%)': 94.0, 'Core3(%)': 93.0, 'Core4(%)': 93.0, 'Core5(%)': 93.0, 'Core6(%)': 92.0, 'Core7(%)': 93.0, 'MemoriaUsada(Mb)': 1340.8, 'MemoriaDisponible(Mb)': 6663.6, 'MemoriaTotal(Mb)': 8330.4, 'AlmacenamientoUsado(Gb)': 3.4, 'AlmacenamientoUsado(%)': 17, 'AlmacenamientoTotal(Gb)': 19.2, 'timestamp': '30-06-2024 19:47:33'}
INFO: 10.0.0.40:35200 - "POST /data HTTP/1.1" 200 OK
Received data: {'worker1': '10.0.0.30', 'Core0(%)': 96.0, 'Core1(%)': 94.0, 'Core2(%)': 95.0, 'Core3(%)': 94.0, 'Core4(%)': 93.0, 'Core5(%)': 94.0, 'Core6(%)': 95.0, 'Core7(%)': 93.0, 'MemoriaUsada(Mb)': 1338.1, 'MemoriaDisponible(Mb)': 6669.7, 'MemoriaTotal(Mb)': 8338.4, 'AlmacenamientoUsado(Gb)': 3.3, 'AlmacenamientoUsado(%)': 17, 'AlmacenamientoTotal(Gb)': 19.2, 'timestamp': '30-06-2024 19:47:33'}
```

The screenshot shows a web application interface for monitoring cloud resources. On the left, a sidebar menu lists categories: Databases, admin, cloud (which is selected and highlighted with a red box), availability_zones, celery_taskmeta, flavors, images, logs, resources (which is also highlighted with a red box), slices, templates, and users. Below the sidebar, there is a search bar and a button to add new data. A table displays resource usage data for three workers, with the first worker's row highlighted by a red box. The table includes columns for worker ID, core usage percentages, memory usage in MB and GB, and timestamp. The bottom right corner of the interface shows a status message: '981 - 1000 of 1000'.

worker	Core0(%)	Core1(%)	Core2(%)	Core3(%)	Core4(%)	Core5(%)	Core6(%)	Core7(%)	MemoriaUsada(Mb)	MemoriaDisponible(Mb)	MemoriaTotal(Mb)	AlmacenamientoUsado(Gb)	AlmacenamientoUsado(%)	AlmacenamientoTotal(Gb)	timestamp
worker1	96.0	94.0	95.0	94.0	93.0	94.0	95.0	93.0	1338.1	6669.7	8338.4	3.3	17	19.2	'30-06-2024 19:47:33'
worker2	92.0	93.0	94.0	93.0	93.0	93.0	92.0	93.0	1340.8	6663.6	8330.4	3.4	17	19.2	'30-06-2024 19:47:33'
worker3	93.0	96.0	92.0	94.0	95.0	94.0	94.0	97.0	1437.1	6573.2	8330.3	3.4	18	19.2	'30-06-2024 19:47:32'

GRACIAS