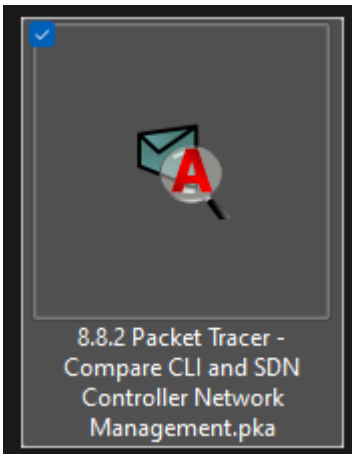
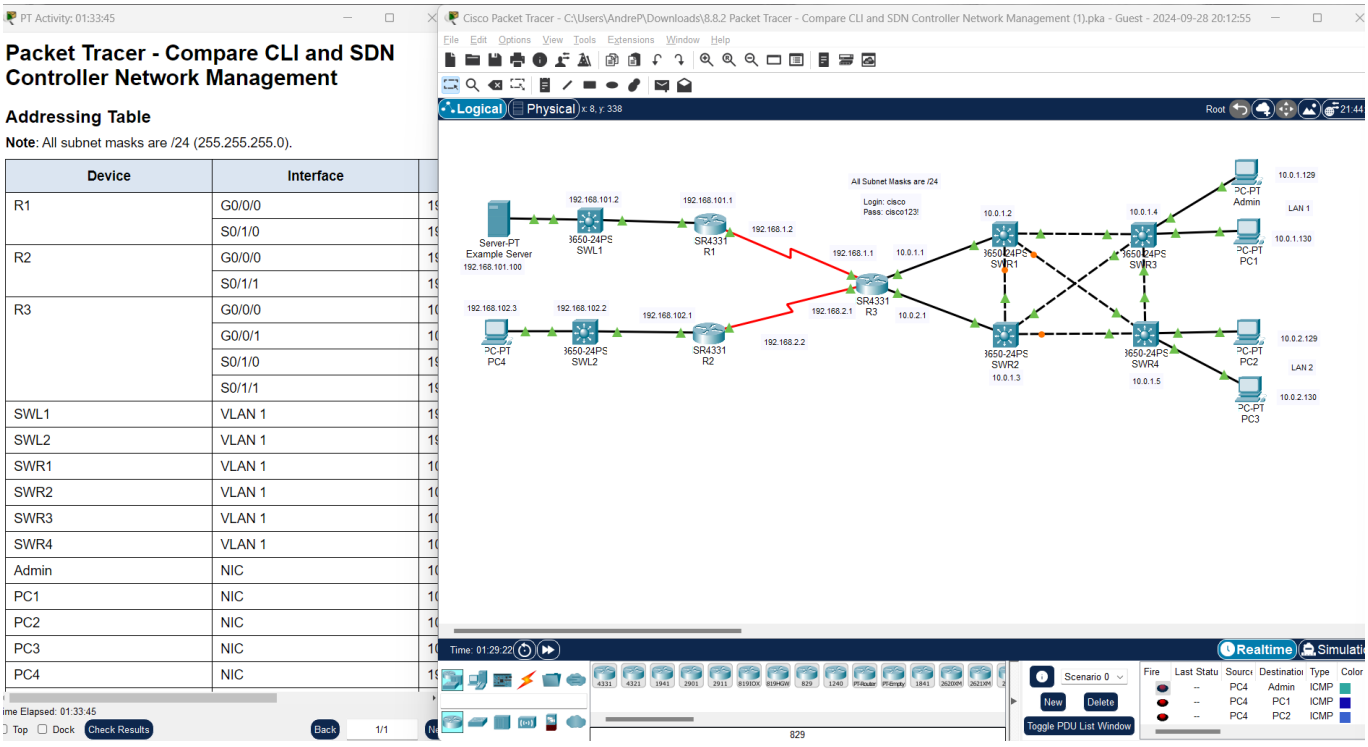
Practice 1 - Network Administration (CC 312)

Part 1: Packet Tracer - Compare CLI and SDN Controller NetworkManagement

Ingresamos al Packet Tracer. Tuve que buscar el .pka en internet para cargarlo y desarrollar el laboratorio.

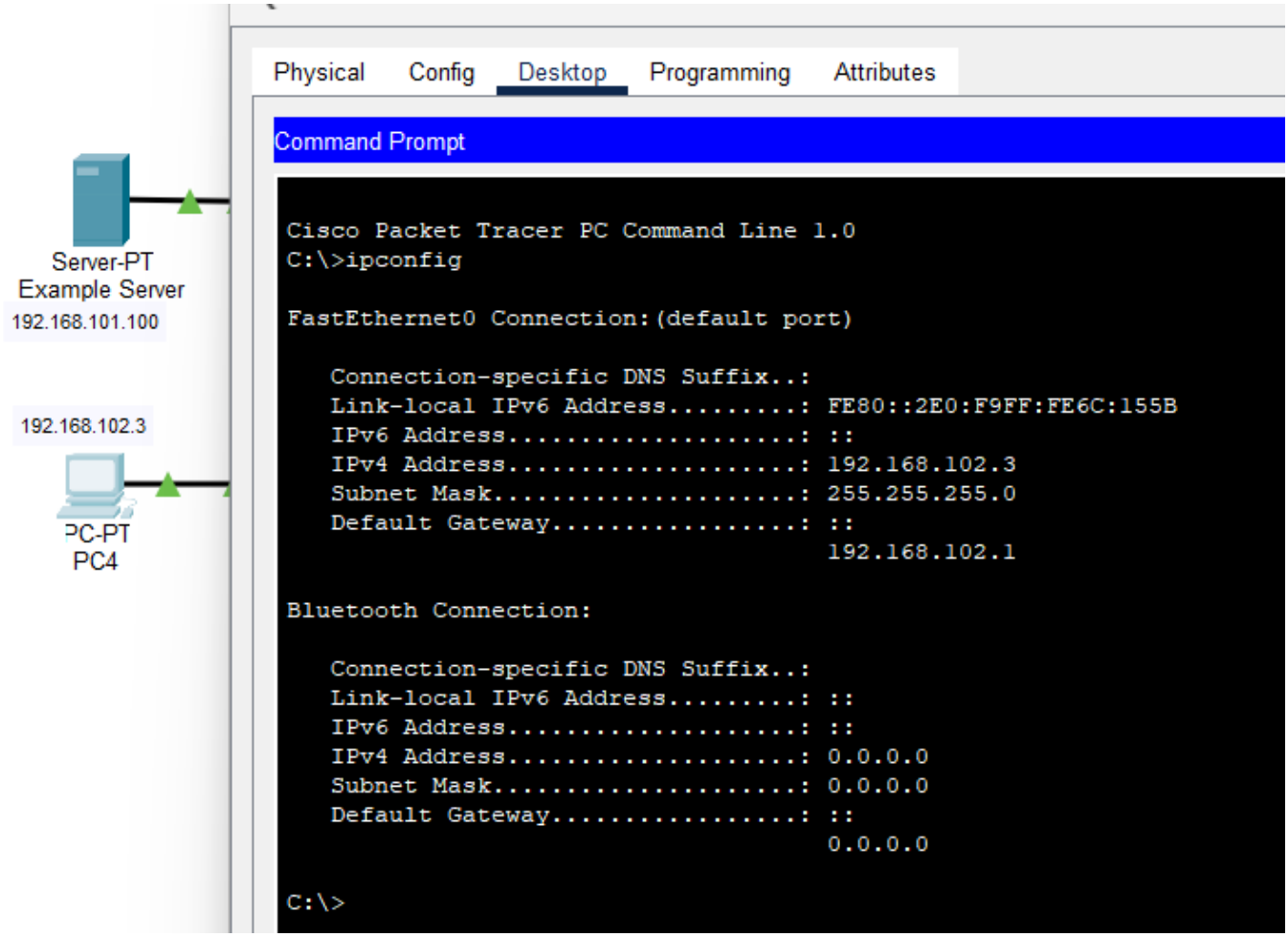




Usamos la CLI para recolección de datos de la red:

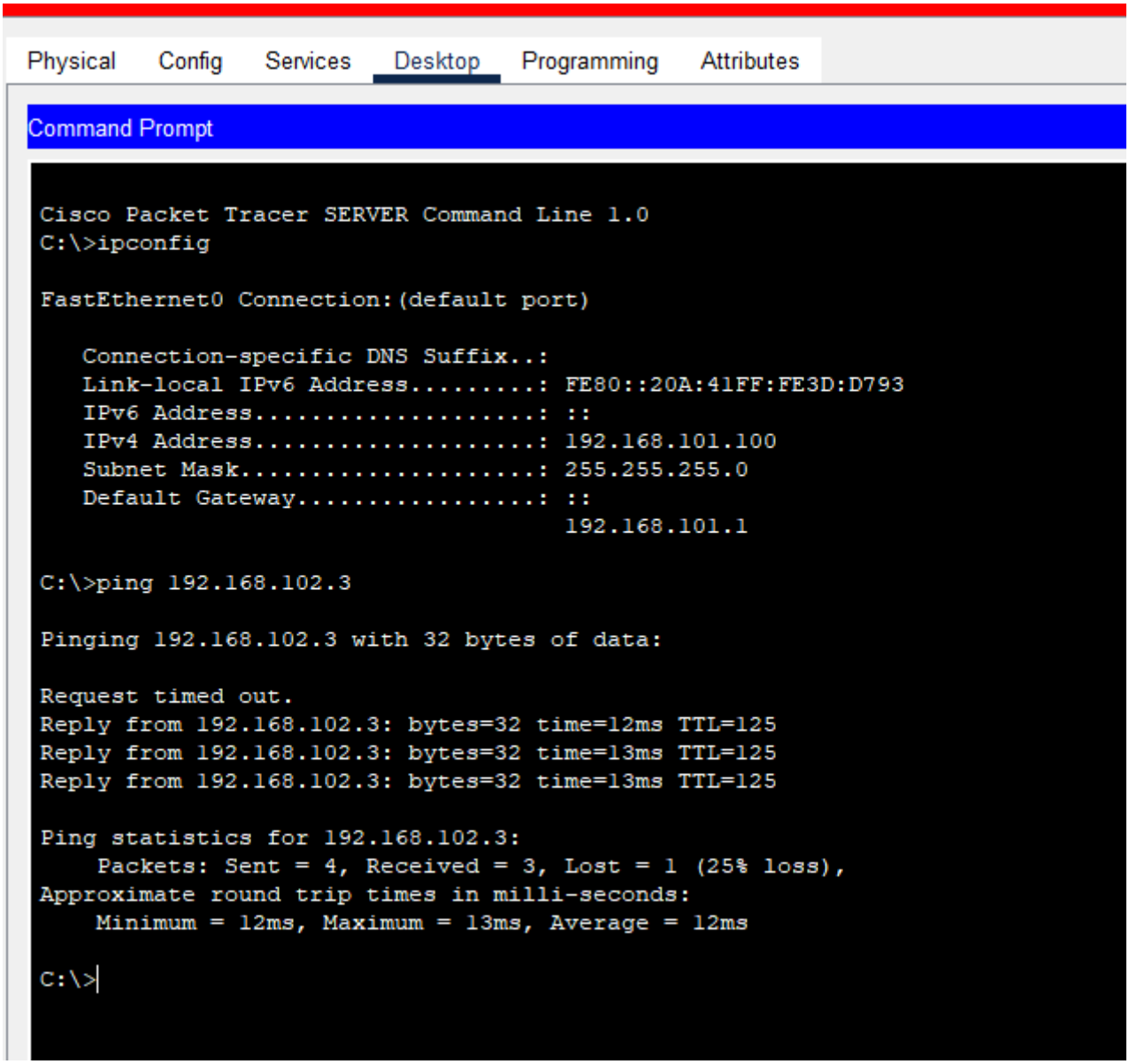
Nos aseguramos que los dispositivos pueden pingearse:

Ipv4 address de PC4 : 192.168.102.3

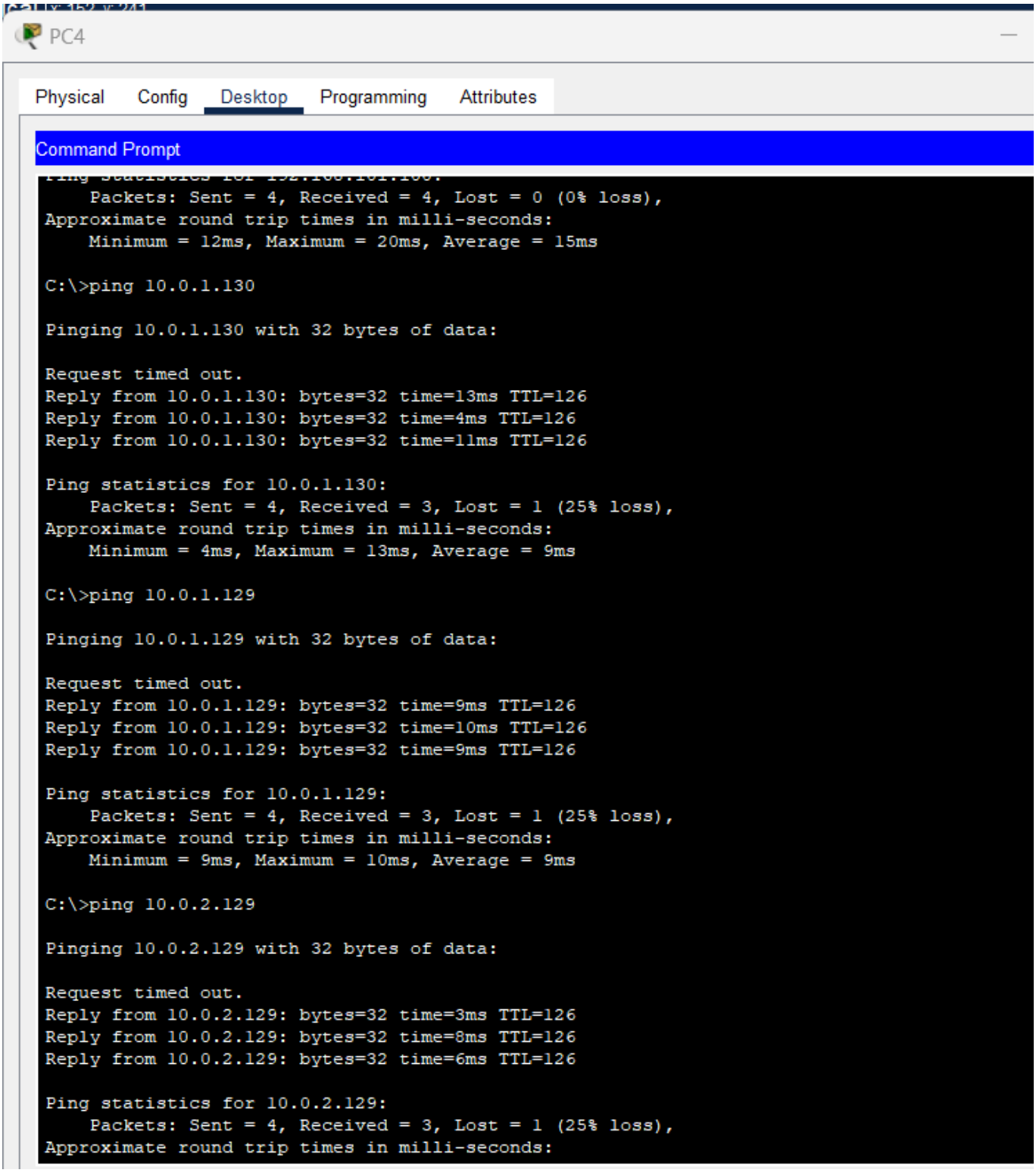


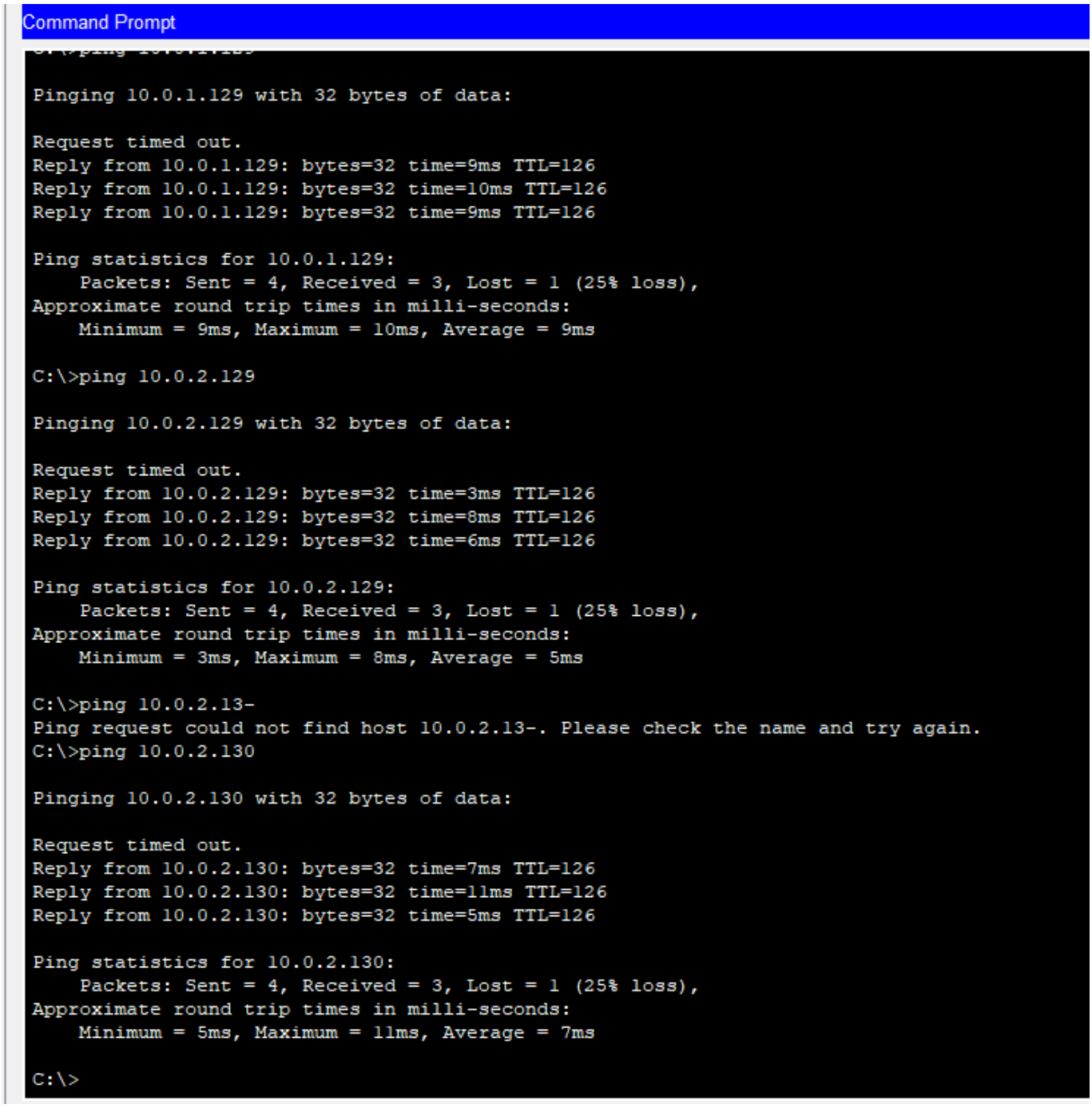
Ipv4 address de Example Server: 192.168.101.100

Haciendo el ping desde server a PC4:



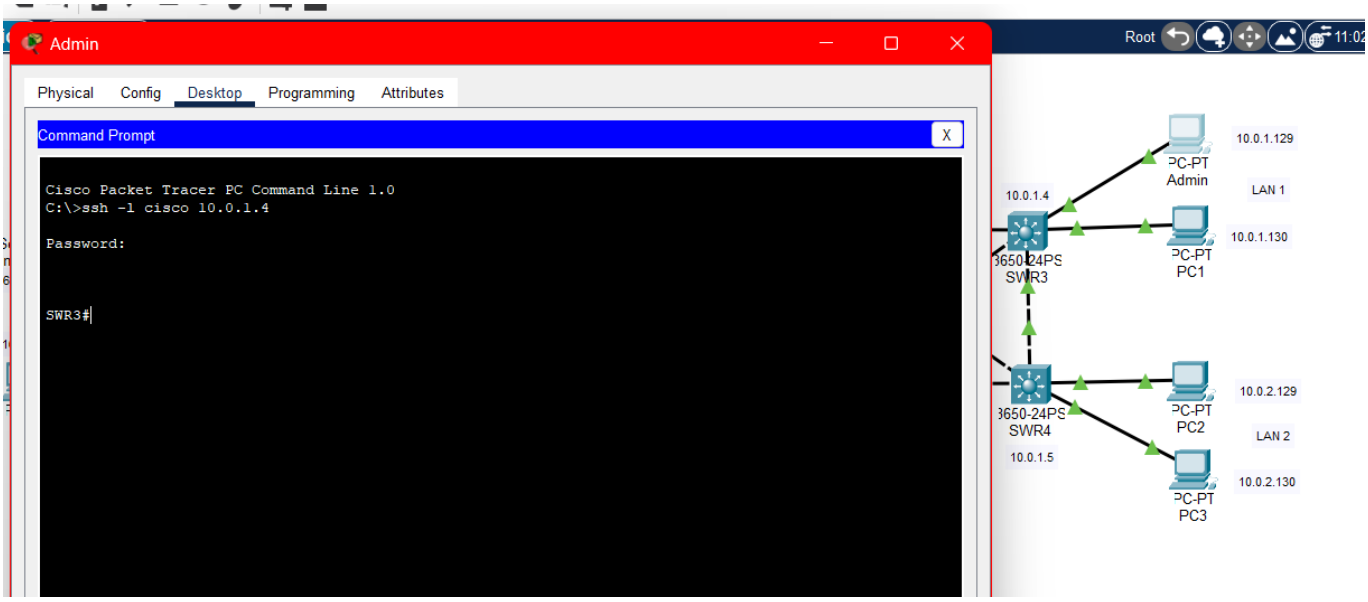
Ahora hagamos pings desde los otros dispositivos a PC4:


PC4
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 12ms, Maximum = 20ms, Average = 15ms
C:\>ping 10.0.1.130
Pinging 10.0.1.130 with 32 bytes of data:
Request timed out.
Reply from 10.0.1.130: bytes=32 time=13ms TTL=126
Reply from 10.0.1.130: bytes=32 time=4ms TTL=126
Reply from 10.0.1.130: bytes=32 time=11ms TTL=126
Ping statistics for 10.0.1.130:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 13ms, Average = 9ms
C:\>ping 10.0.1.129
Pinging 10.0.1.129 with 32 bytes of data:
Request timed out.
Reply from 10.0.1.129: bytes=32 time=9ms TTL=126
Reply from 10.0.1.129: bytes=32 time=10ms TTL=126
Reply from 10.0.1.129: bytes=32 time=9ms TTL=126
Ping statistics for 10.0.1.129:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 9ms, Maximum = 10ms, Average = 9ms
C:\>ping 10.0.2.129
Pinging 10.0.2.129 with 32 bytes of data:
Request timed out.
Reply from 10.0.2.129: bytes=32 time=3ms TTL=126
Reply from 10.0.2.129: bytes=32 time=8ms TTL=126
Reply from 10.0.2.129: bytes=32 time=6ms TTL=126
Ping statistics for 10.0.2.129:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:



Observamos que PC4 pudo pingear a todos los dispositivos.

Iniciamos sesión en la PC Admin y accedemos al SWR3 Switch:



Lo que arrojó:

```
Cisco IOS Software [Denali], Catalyst L3 Switch Software (CAT3K_CAA-UNIVERSALK9-
M), Version 16.3.2, RELEASE SOFTWARE (fc4)
BOOTLDR: CAT3K_CAA Boot Loader (CAT3K_CAA-HBOOT-M) Version 4.26, RELEASE SOFTWARE
(P)
```

Hacemos lo mismo con los demás switches:

SWR3:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ssh -l cisco 10.0.1.4

Password:



SWR3#show version | include RELEASE
Cisco IOS Software [Denali], Catalyst L3 Switch Software (CAT3K_CAA-
UNIVERSALK9-M), Version 16.3.2, RELEASE SOFTWARE (fc4)
BOOTLDR: CAT3K_CAA Boot Loader (CAT3K_CAA-HBOOT-M) Version 4.26, RELEASE
SOFTWARE (P)
SWR3#ssh -l cisco 10.0.1.5

Password:



SWR4#show version | include RELEASE
```

SWR1:

```
SWR1#show version | include RELEASE
Cisco IOS Software [Denali], Catalyst L3 Switch Software (CAT3K_CAA-
UNIVERSALK9-M), Version 16.3.2, RELEASE SOFTWARE (fc4)
BOOTLDR: CAT3K_CAA Boot Loader (CAT3K_CAA-HBOOT-M) Version 4.26,
RELEASE SOFTWARE (P)
SWR1#ssh -l cisco 10.0.1.3

Password:
```

SWR2:

```
SWR2#show version | include RELEASE
Cisco IOS Software [Denali], Catalyst L3 Switch Software (CAT3K_CAA-
UNIVERSALK9-M), Version 16.3.2, RELEASE SOFTWARE (fc4)
BOOTLDR: CAT3K_CAA Boot Loader (CAT3K_CAA-HBOOT-M) Version 4.26,
RELEASE SOFTWARE (P)
SWR2#ssh -l cisco 10.0.1.1

Password:
```

SWR4:

```
SWR4#show version | include RELEASE
Cisco IOS Software [Denali], Catalyst L3 Switch Software (CAT3K_CAA-
UNIVERSALK9-M), Version 16.3.2, RELEASE SOFTWARE (fc4)
BOOTLDR: CAT3K_CAA Boot Loader (CAT3K_CAA-HBOOT-M) Version 4.26,
RELEASE SOFTWARE (P)
SWR4#ssh -l cisco 10.0.1.2

Password:
```

R1:

```
R1#show version | include RELEASE
Cisco IOS Software, ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M),
Version Version 15.5 (3)S5, RELEASE SOFTWARE (fc2)
```

R2:

```
R2#show version | include RELEASE
Cisco IOS Software, ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M),
Version Version 15.5 (3)S5, RELEASE SOFTWARE (fc2)
```

R3:

```
R3#show version | include RELEASE
Cisco IOS Software, ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M),
Version Version 15.5 (3)S5, RELEASE SOFTWARE (fc2)
```

SWL1:

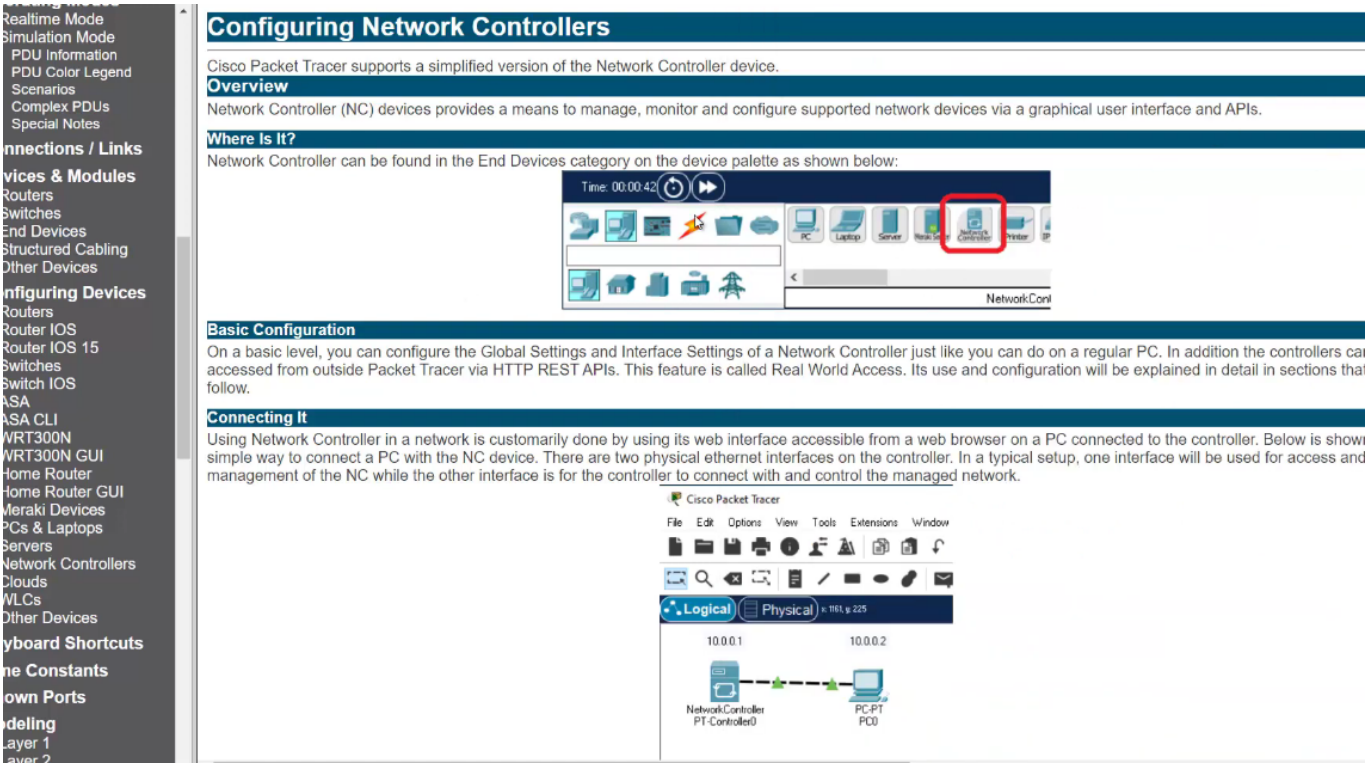
```
SWL1#show version | include RELEASE
Cisco IOS Software [Denali], Catalyst L3 Switch Software (CAT3K_CAA-
UNIVERSALK9-M), Version 16.3.2, RELEASE SOFTWARE (fc4)
BOOTLDR: CAT3K_CAA Boot Loader (CAT3K_CAA-HBOOT-M) Version 4.26,
RELEASE SOFTWARE (P)
```

SWL2:

```
SWL2#show version | include RELEASE
Cisco IOS Software [Denali], Catalyst L3 Switch Software (CAT3K_CAA-
UNIVERSALK9-M), Version 16.3.2, RELEASE SOFTWARE (fc4)
BOOTLDR: CAT3K_CAA Boot Loader (CAT3K_CAA-HBOOT-M) Version 4.26,
RELEASE SOFTWARE (P)
SWL2#
```

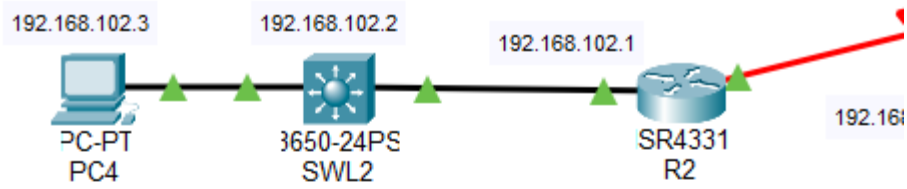
Luego salimos de las sesiones ssh con `exit` en bucle hasta llegar a la PC Admin.

Siguiendo la guía entré a la guía de configuración de controles de red

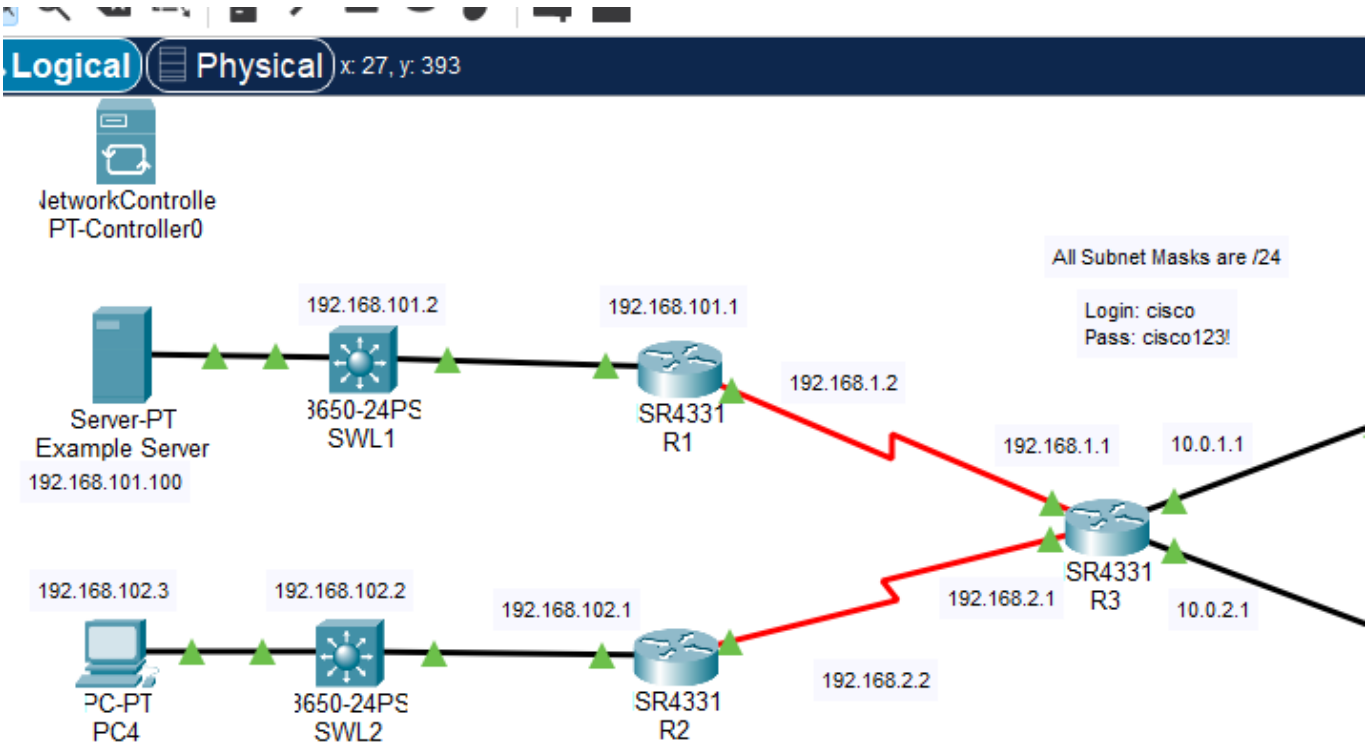


Luego seguí con los pasos de la guía:

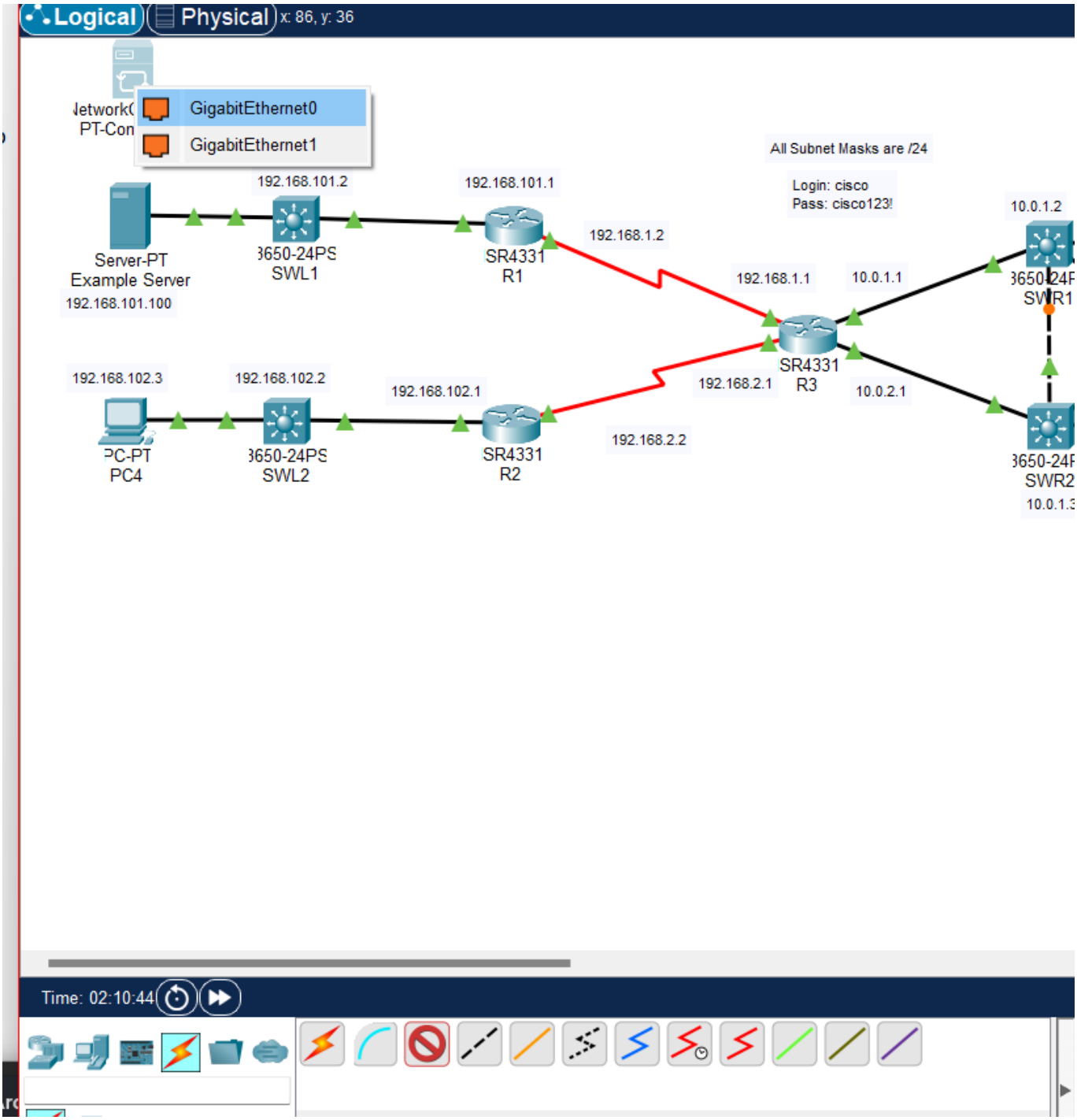
1. Agregar un nuevo control de red:



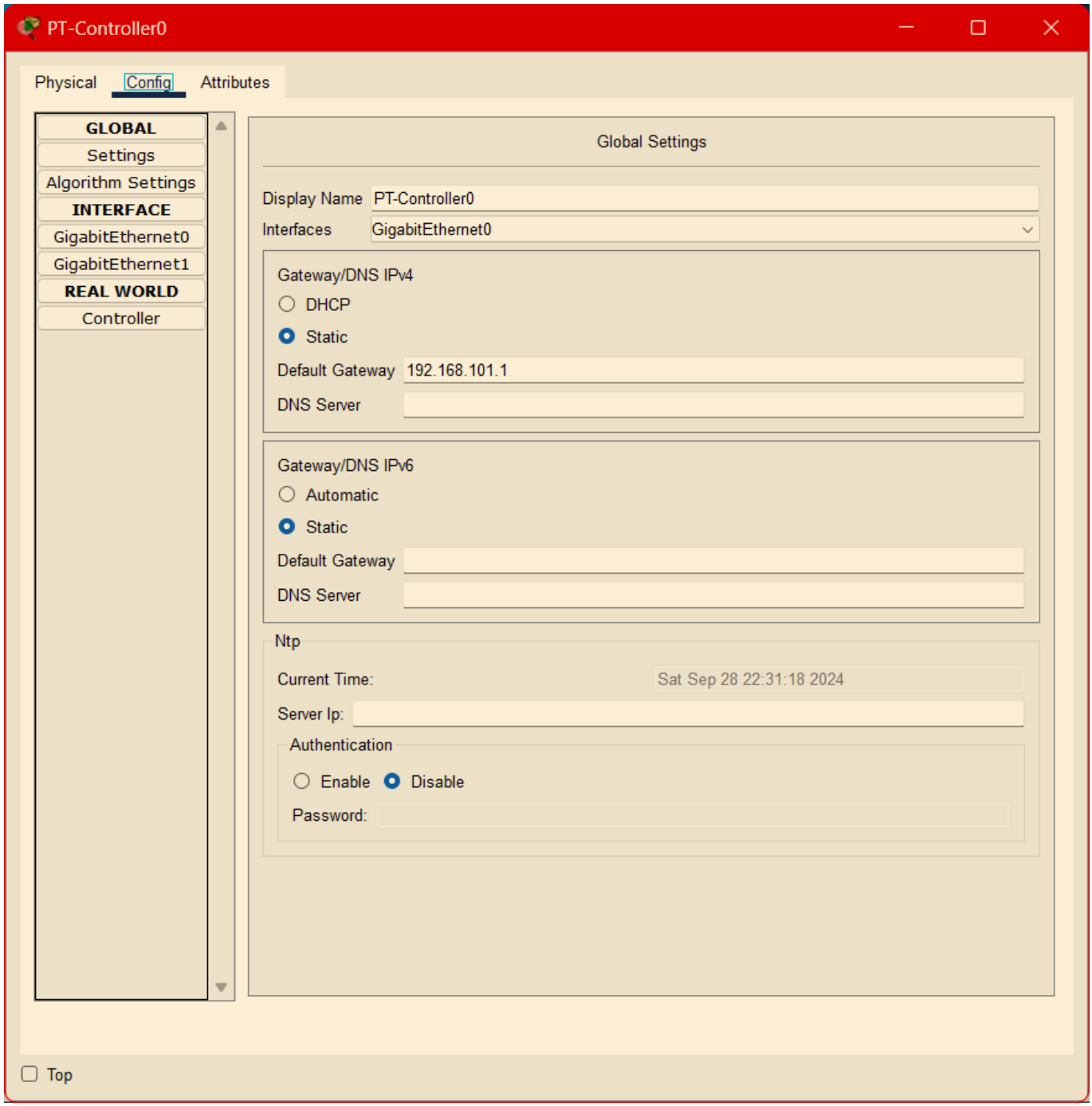
Lo ubiqué donde decía y vi que tiene el nombre que decía en la guía:



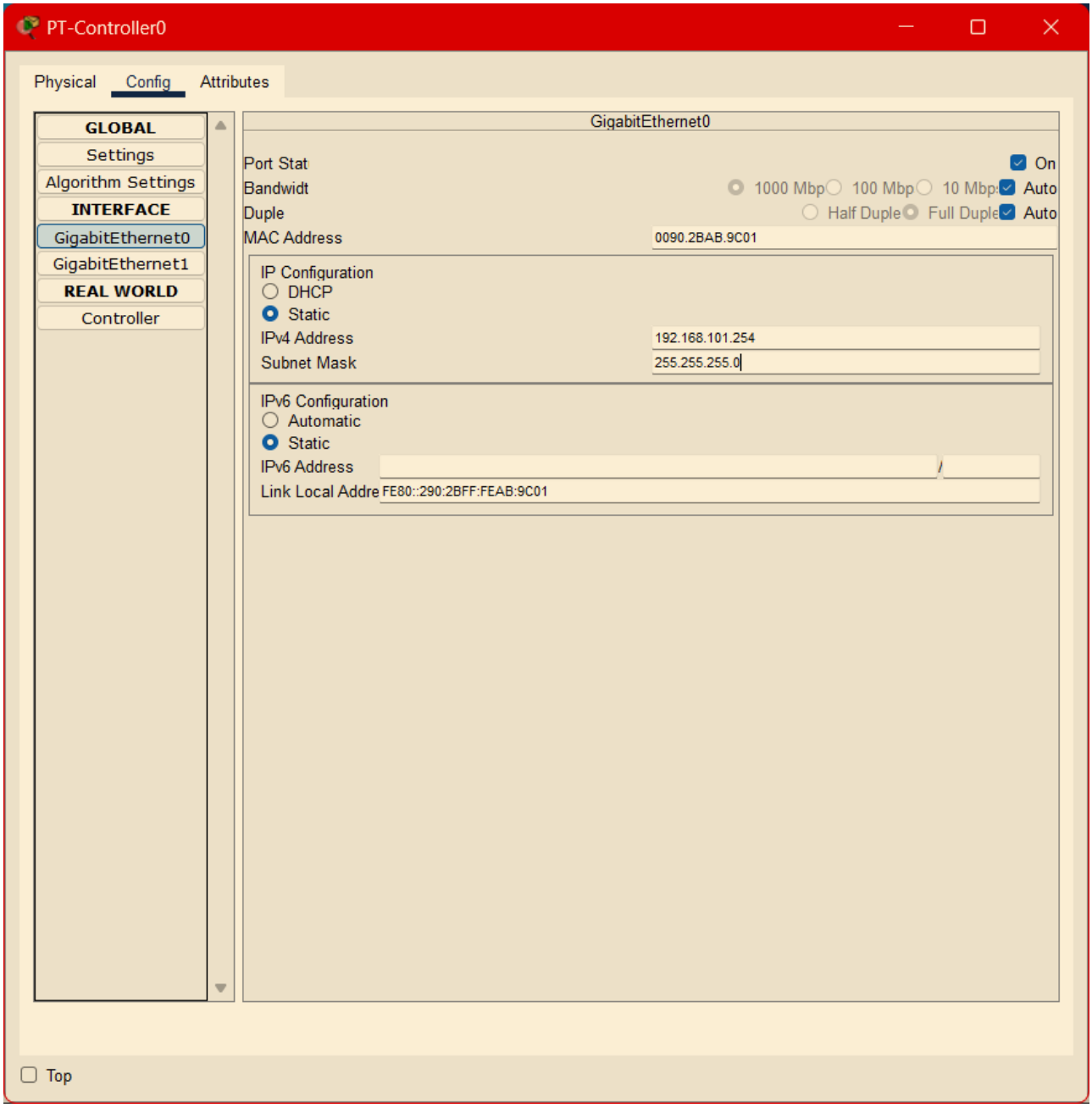
2. Conecto el control de red al switch SWL1



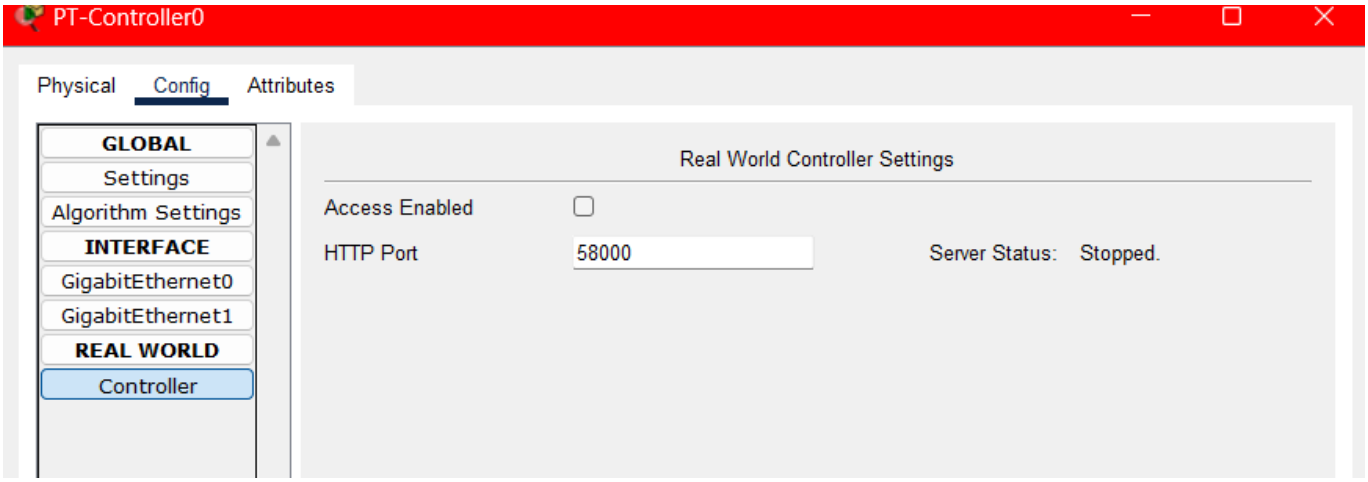
3. Pongo el default gateway en 192.168.101.1


PT-Controller0
Physical
Config
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
GigabitEthernet0
GigabitEthernet1
REAL WORLD
Controller
Global Settings
Display Name
PT-Controller0
Interfaces
GigabitEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
192.168.101.1
DNS Server
Gateway/DNS IPv6
Automatic
Static
Default Gateway
DNS Server
Ntp
Current Time:
Sat Sep 28 22:31:18 2024
Server Ip:
Authentication
Enable
Disable
Password:
Top

4. Configuro interfaz GigabitEthernet0:



5. En REAL WORLD -> Controller; el server status estaba en Stopped así que proseguí como se ve en la guía:



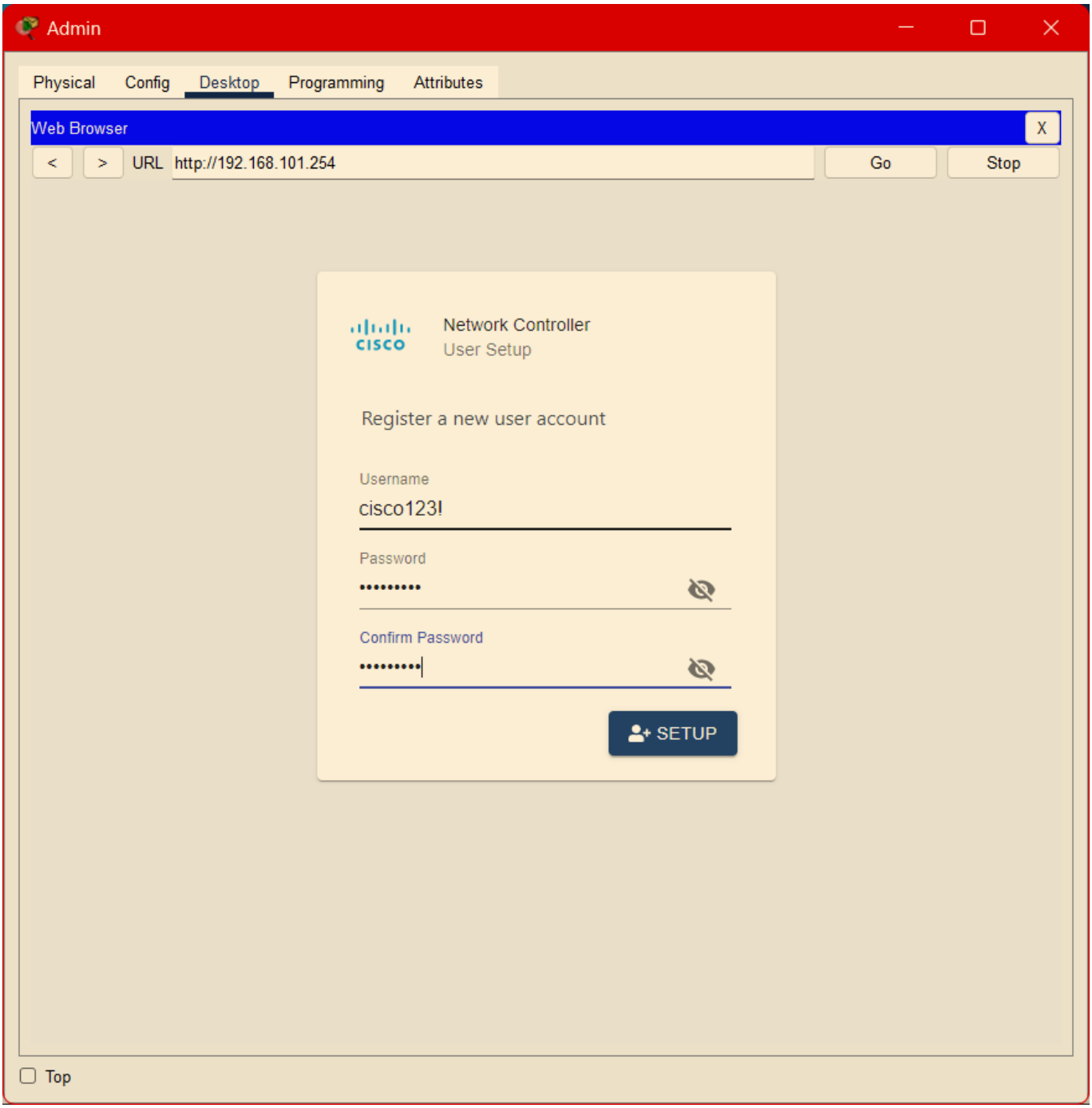
Verificando conectividad con la PC Admin:

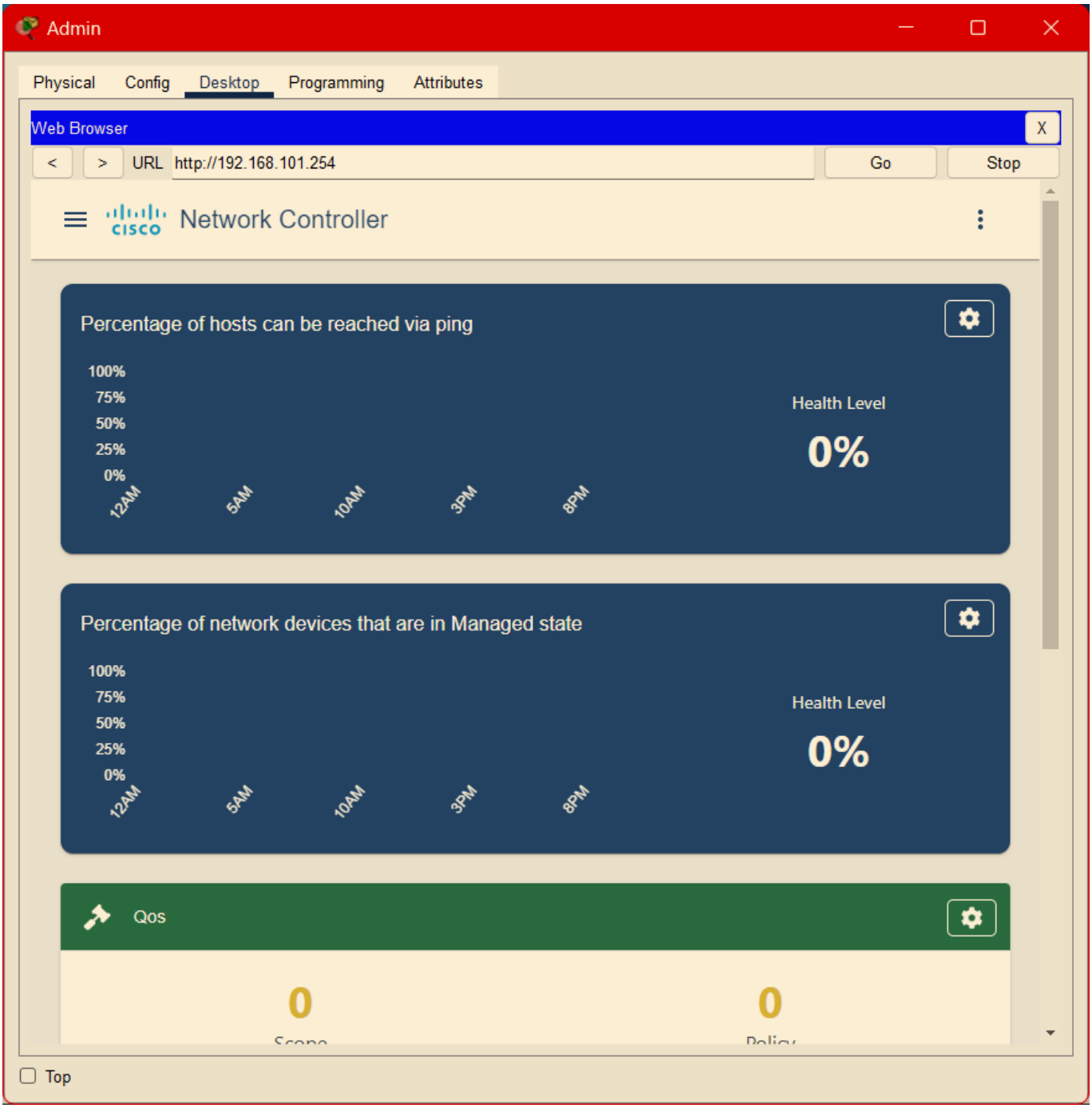
```
C:\>ping 192.168.101.254

Pinging 192.168.101.254 with 32 bytes of data:

Request timed out.
Reply from 192.168.101.254: bytes=32 time=7ms TTL=126
Reply from 192.168.101.254: bytes=32 time=9ms TTL=126
Reply from 192.168.101.254: bytes=32 time=13ms TTL=126

Ping statistics for 192.168.101.254:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 13ms, Average = 9ms
```

Funcionando!

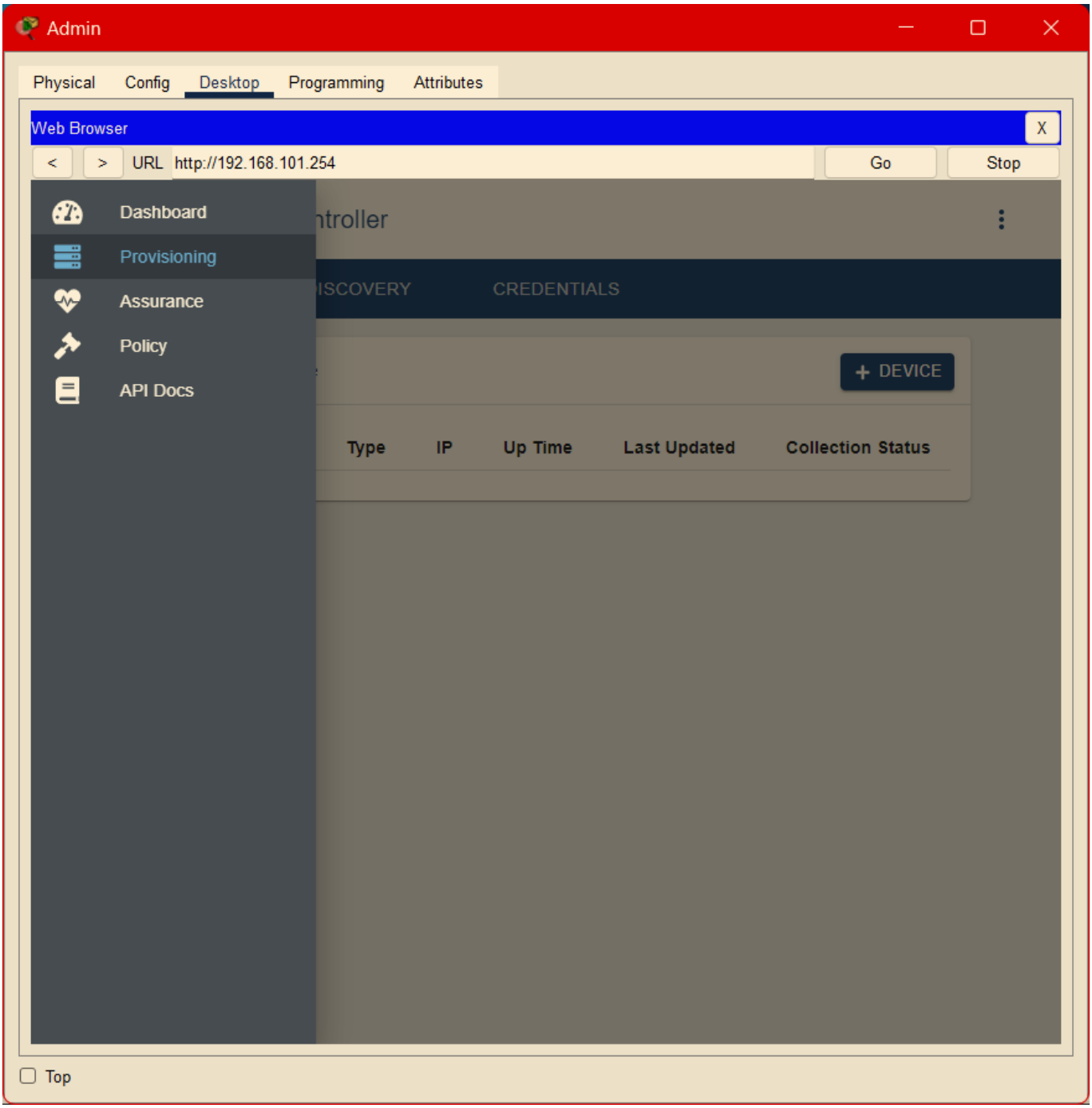
Iniciando sesión a 192.168.101.254 (GigabitEthernet0):

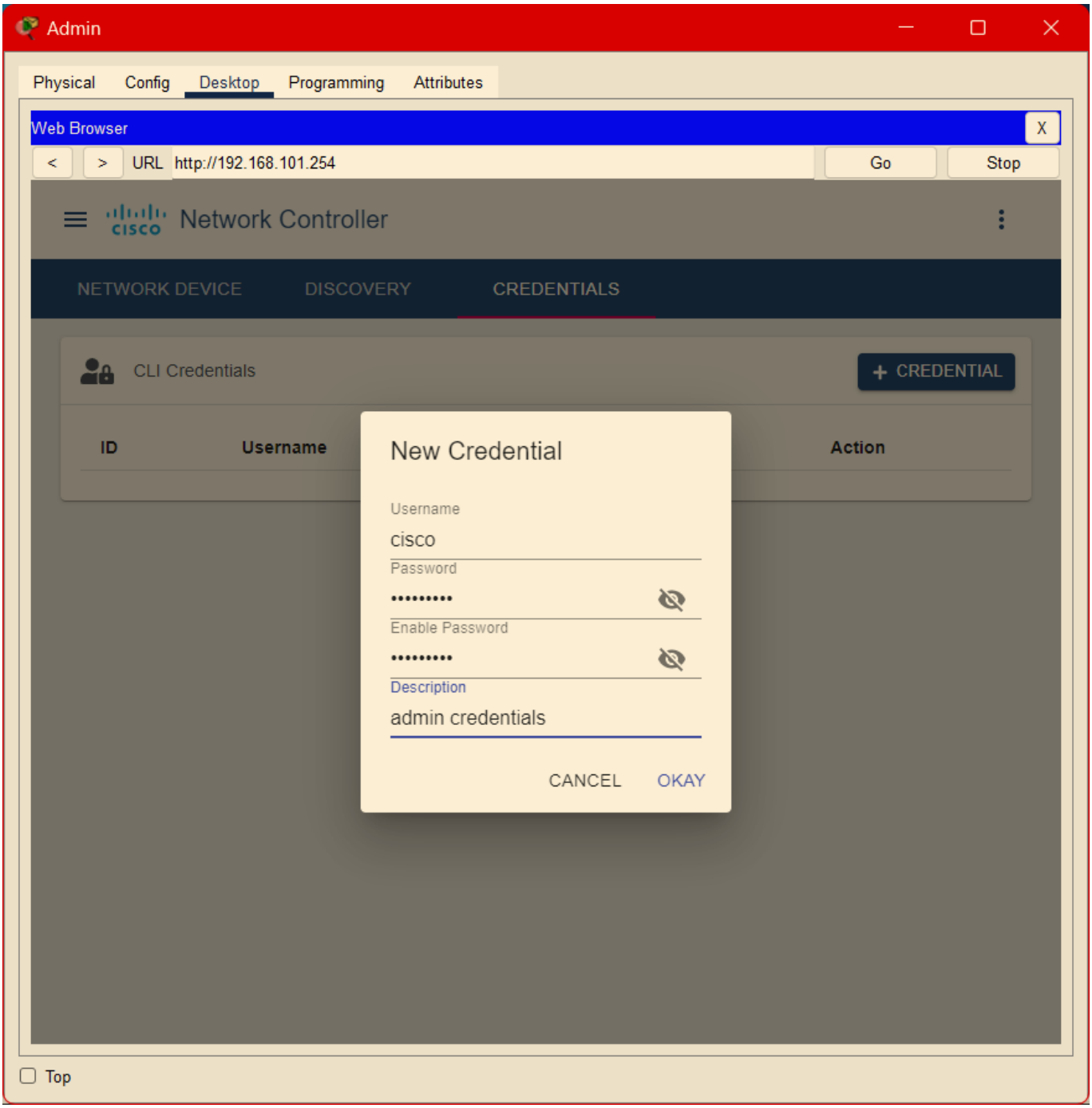
1. Creando un nuevo usuario:


Admin
Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://192.168.101.254
Go
Stop
Network Controller
User Setup
Register a new user account
Username
cisco123!
Password
Confirm Password
SETUP
Top

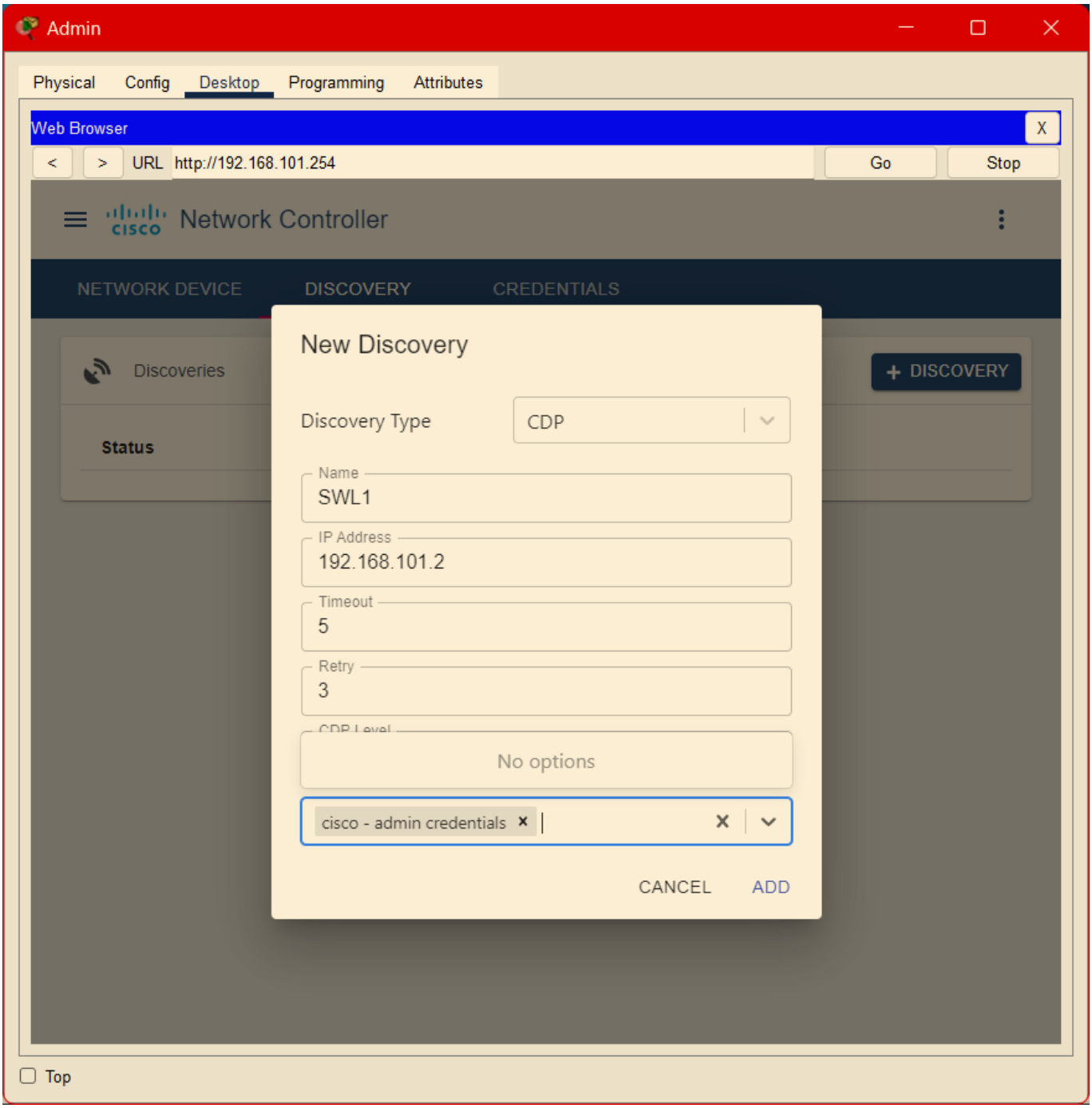


2. Creamos credenciales:

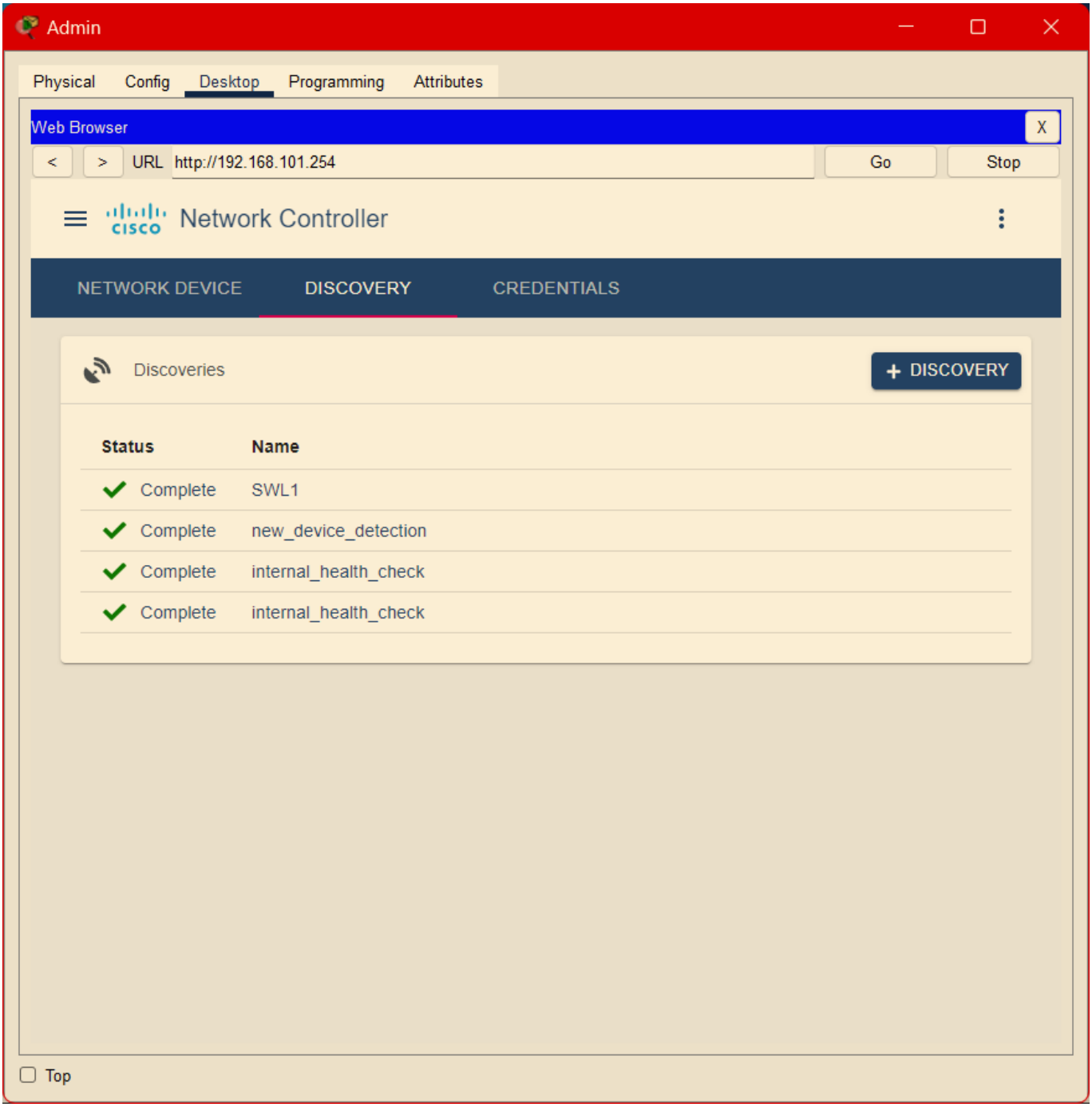

Admin
Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://192.168.101.254
Go
Stop
Dashboard
Provisioning
Assurance
Policy
API Docs
ntroller
ISCOVERY
CREDENTIALS
+ DEVICE
Type
IP
Up Time
Last Updated
Collection Status
Top



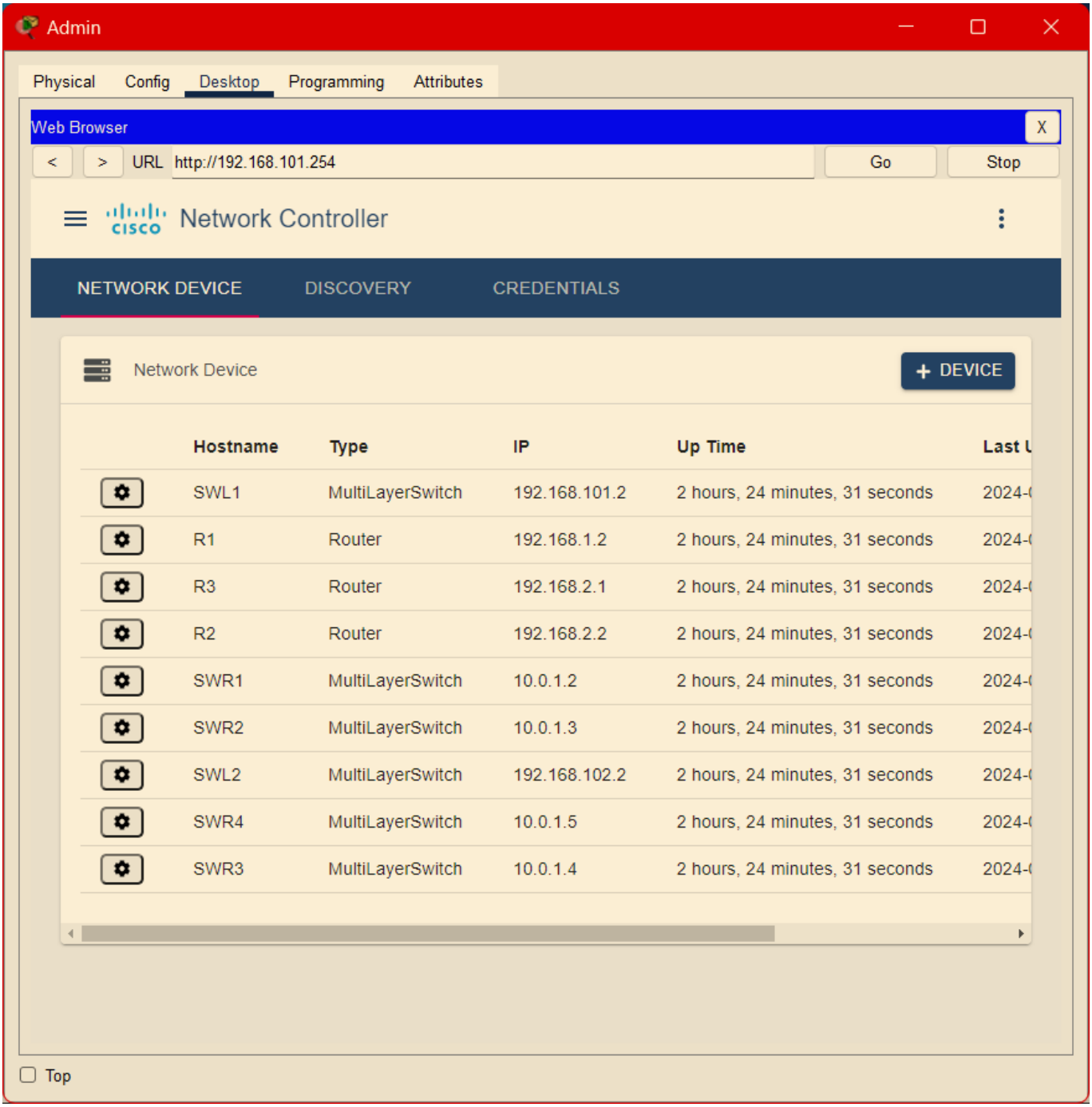
3. Usamos CDP para obtener información de los dispositivos:


Admin
Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://192.168.101.254
Go
Stop
Network Controller
NETWORK DEVICE
DISCOVERY
CREDENTIALS
Discoveries
+ DISCOVERY
Status
New Discovery
Discovery Type
CDP
Name
SWL1
IP Address
192.168.101.2
Timeout
5
Retry
3
No options
cisco - admin credentials
CANCEL
ADD
Top

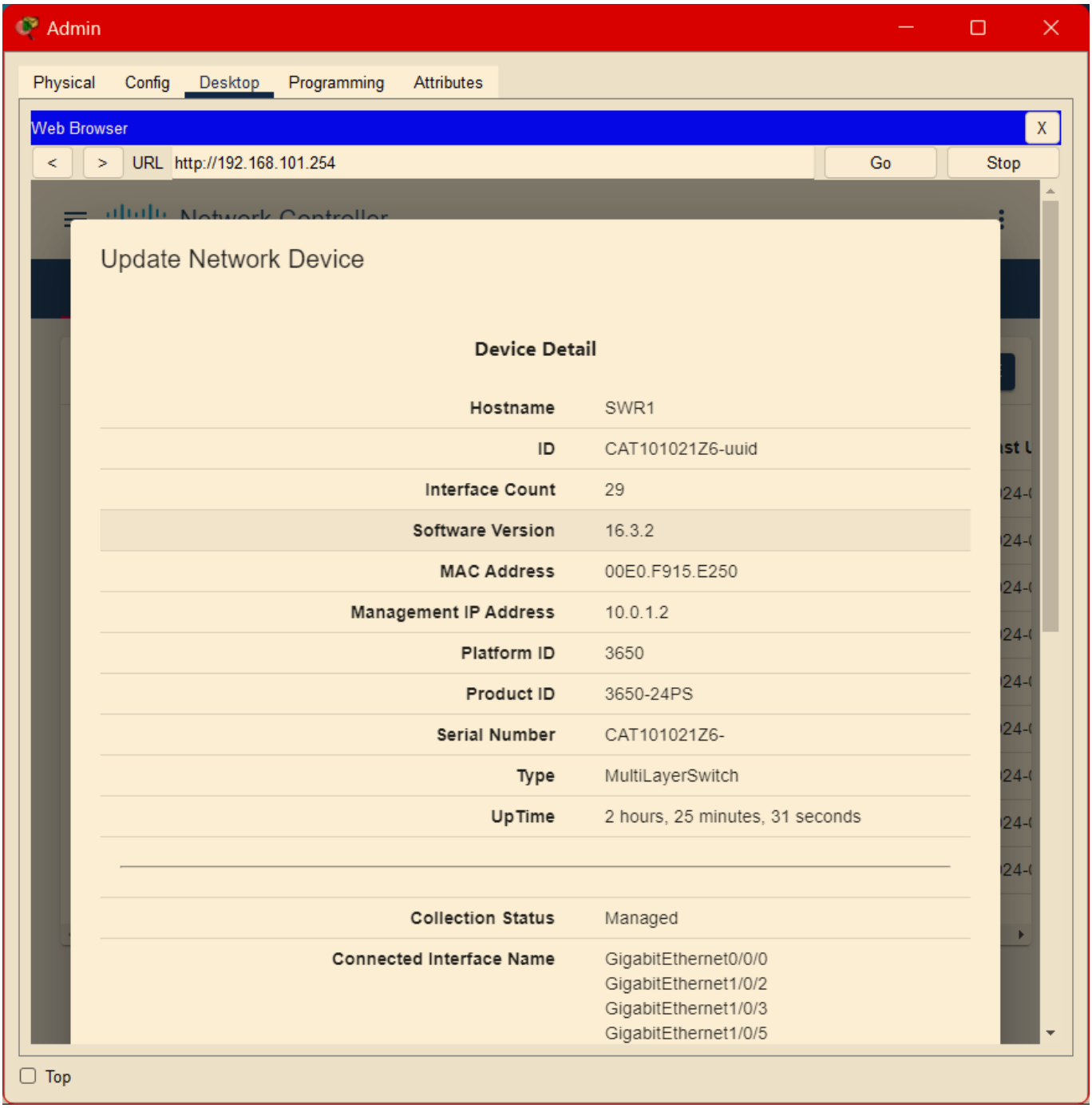
Esperamos a que termine el proceso de discovery:



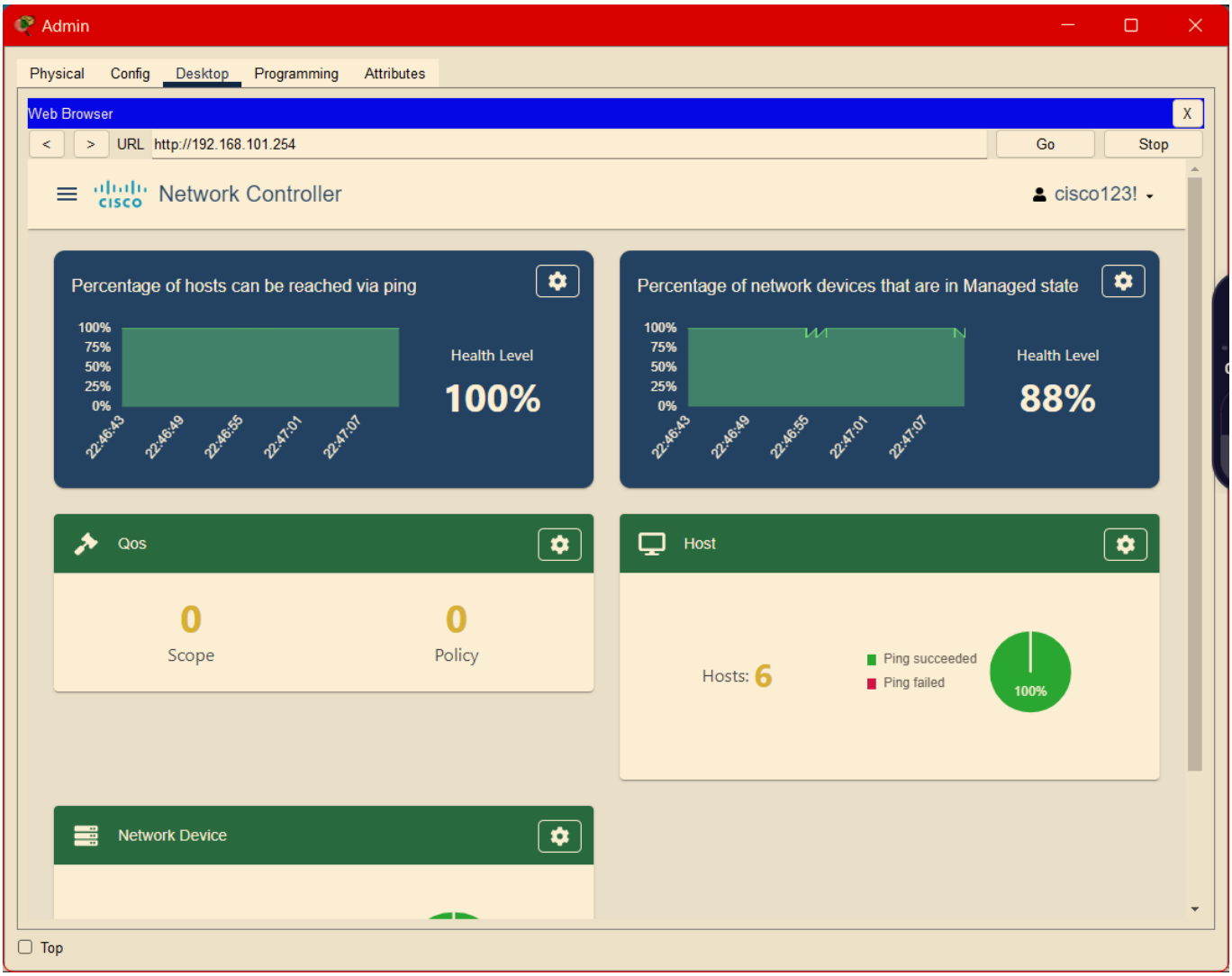
Devices:



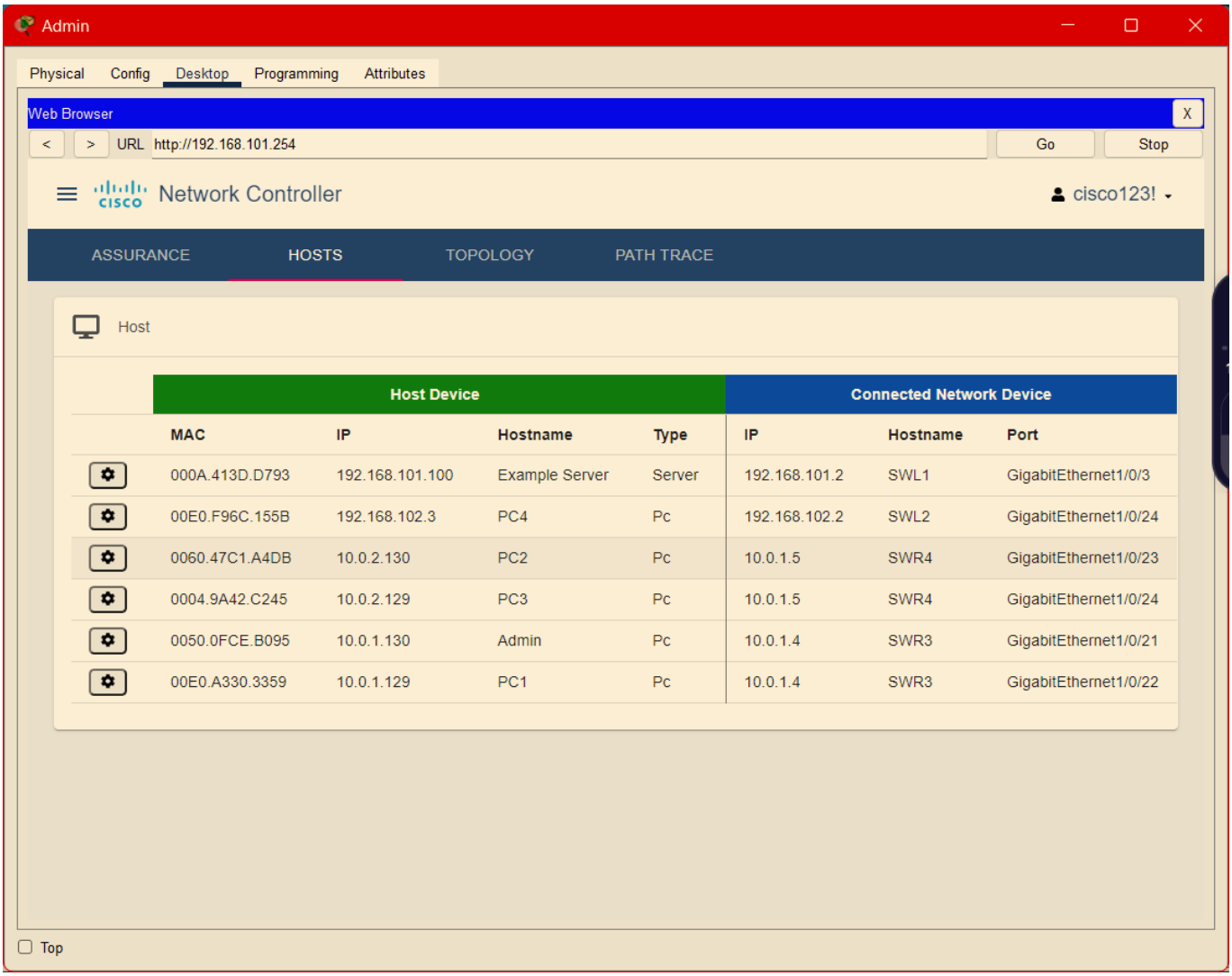
De esta manera es más fácil ver la configuración de cada dispositivo.



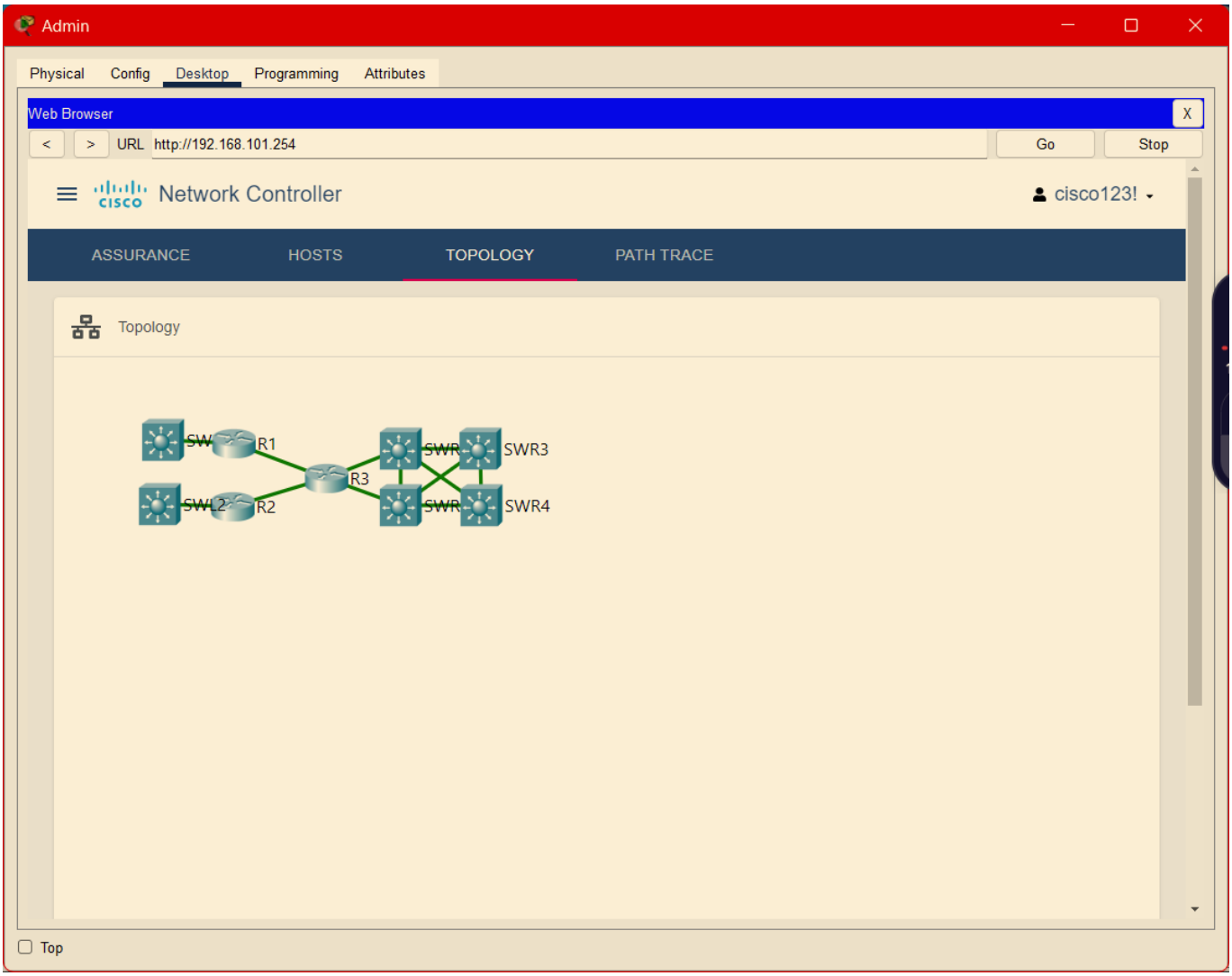
Vemos las dashboards del Network Controller:



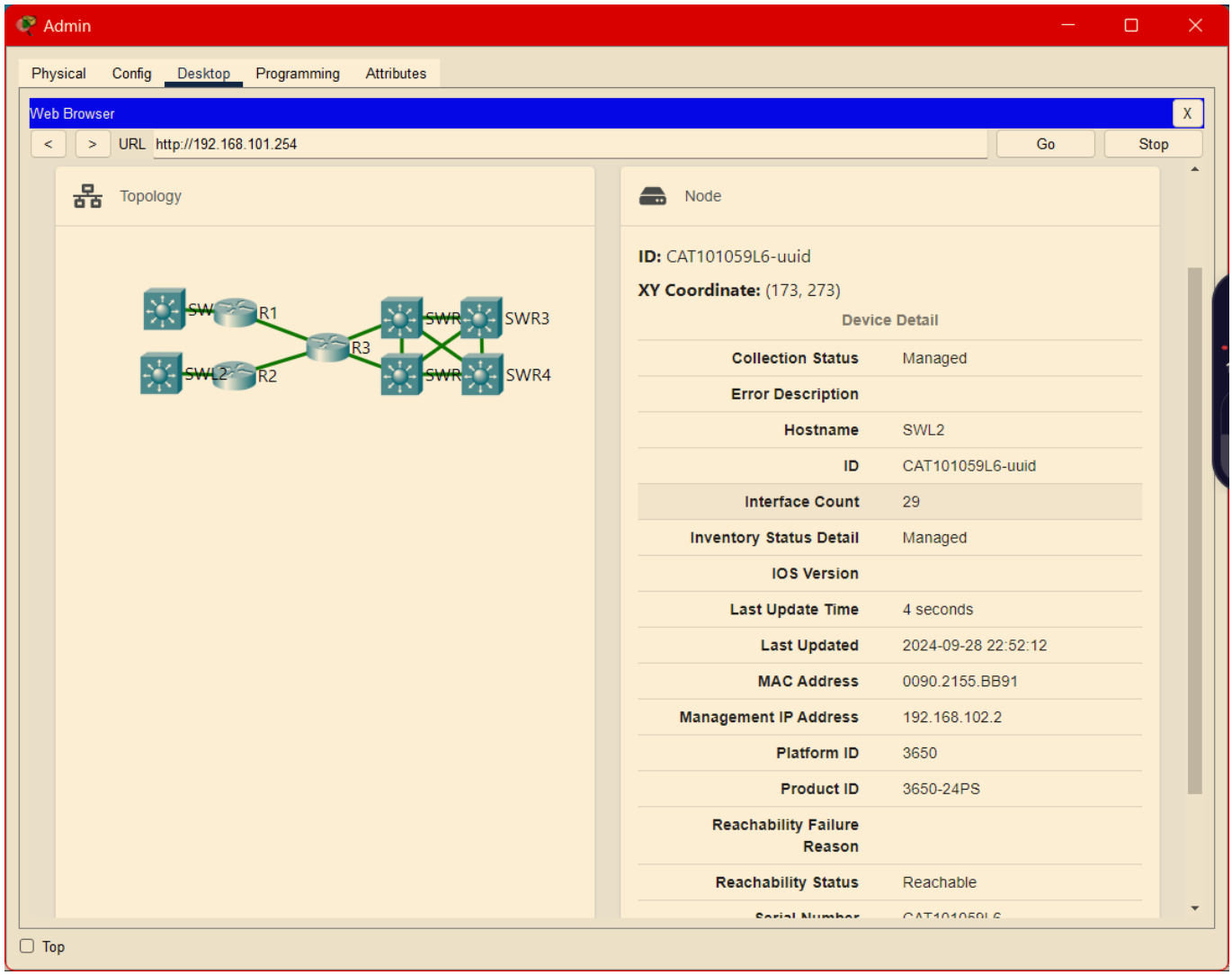
Se ve como una herramienta útil para la administración y monitoreo de la red. Vemos el número de hosts y devices.



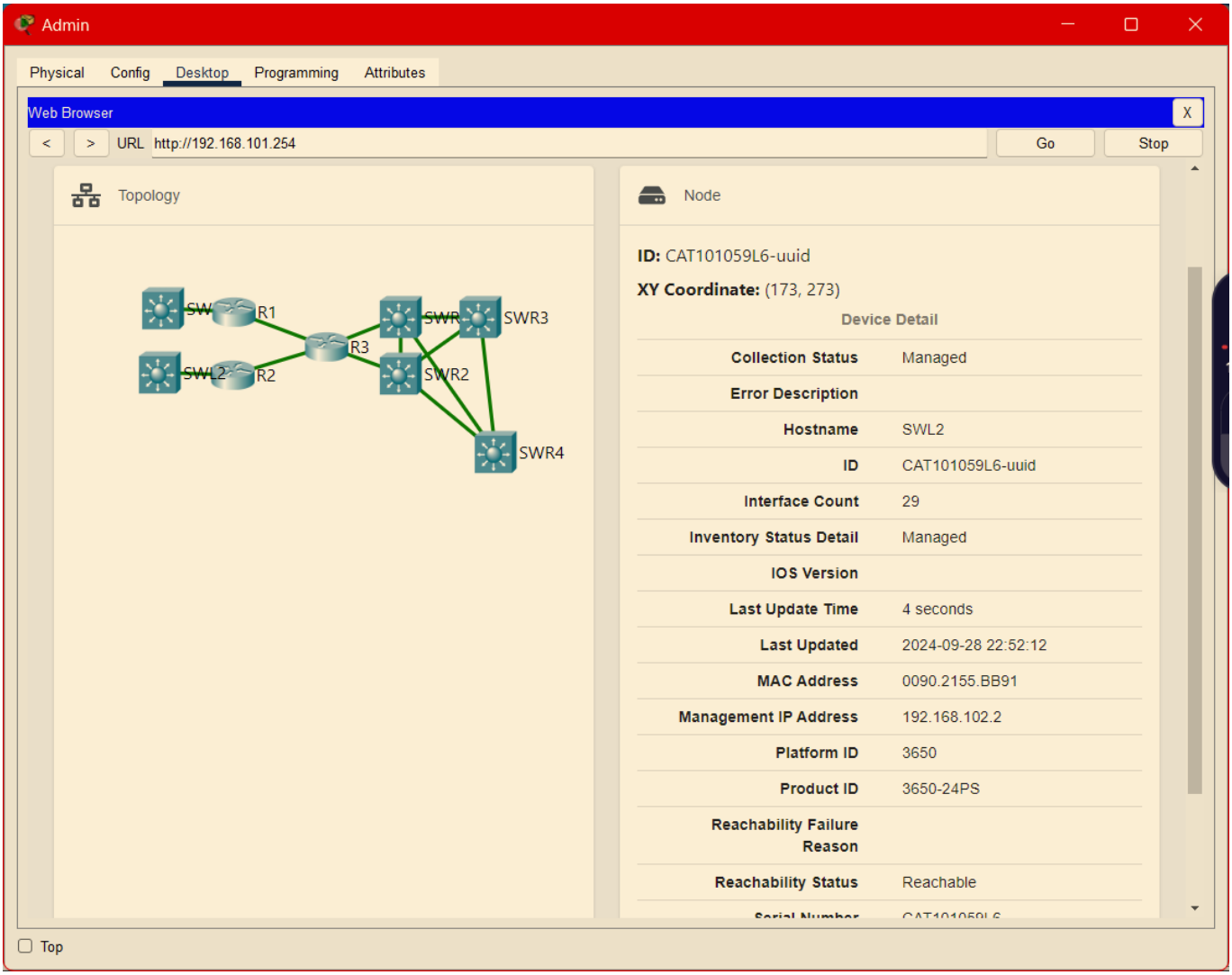
También podemos ver el topology de la red:



Se puede ver el detalle de cada switch:

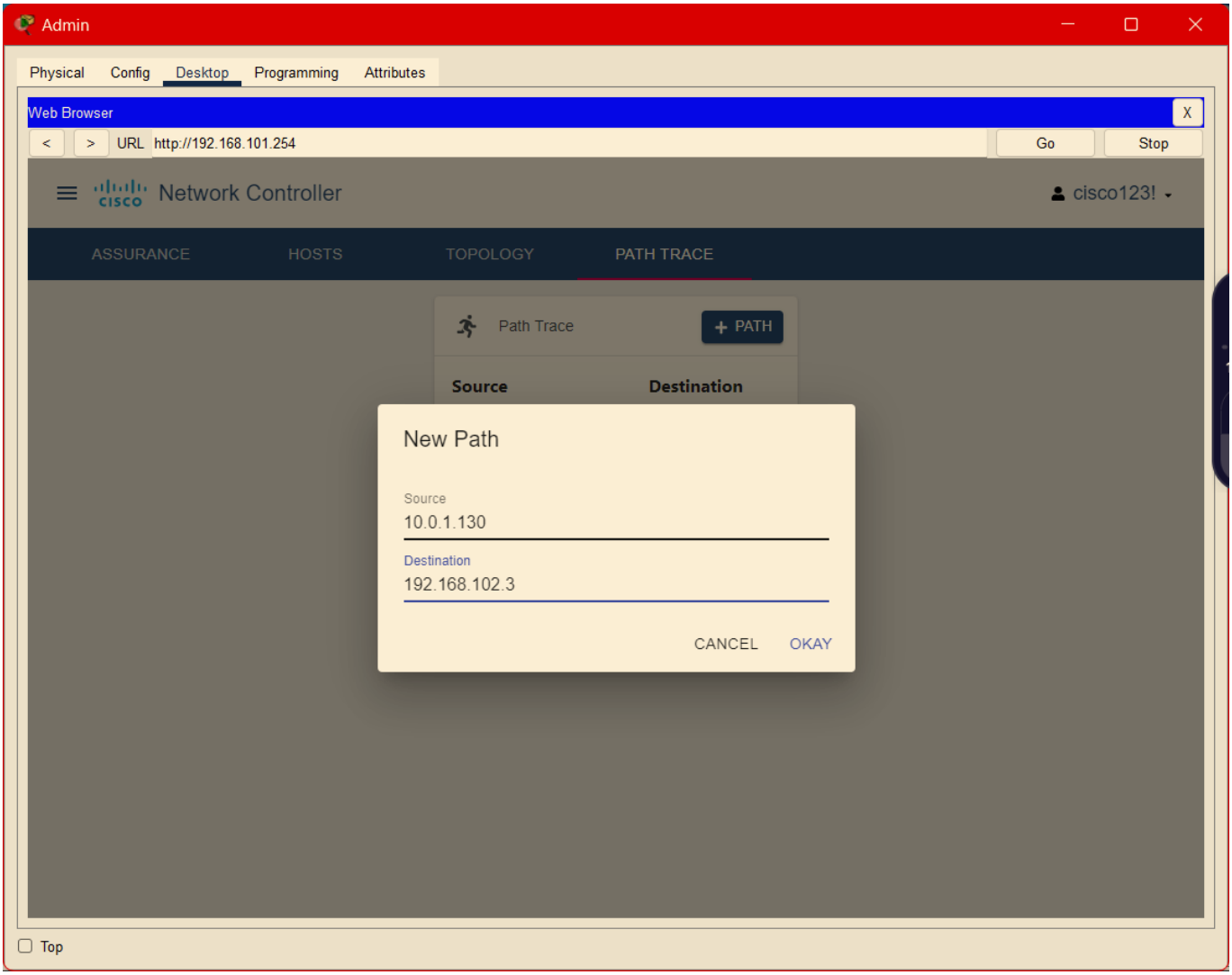

Admin
Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://192.168.101.254
Go
Stop
Topology
SW
R1
R3
SWL2
R2
SWR
SWR3
SWR
SWR4
Node
ID: CAT101059L6-uuid
XY Coordinate: (173, 273)
Device Detail
Collection Status Managed
Error Description
Hostname SWL2
ID CAT101059L6-uuid
Interface Count 29
Inventory Status Detail Managed
IOS Version
Last Update Time 4 seconds
Last Updated 2024-09-28 22:52:12
MAC Address 0090.2155.BB91
Management IP Address 192.168.102.2
Platform ID 3650
Product ID 3650-24PS
Reachability Failure Reason
Reachability Status Reachable
Top

También moverlos, etc.

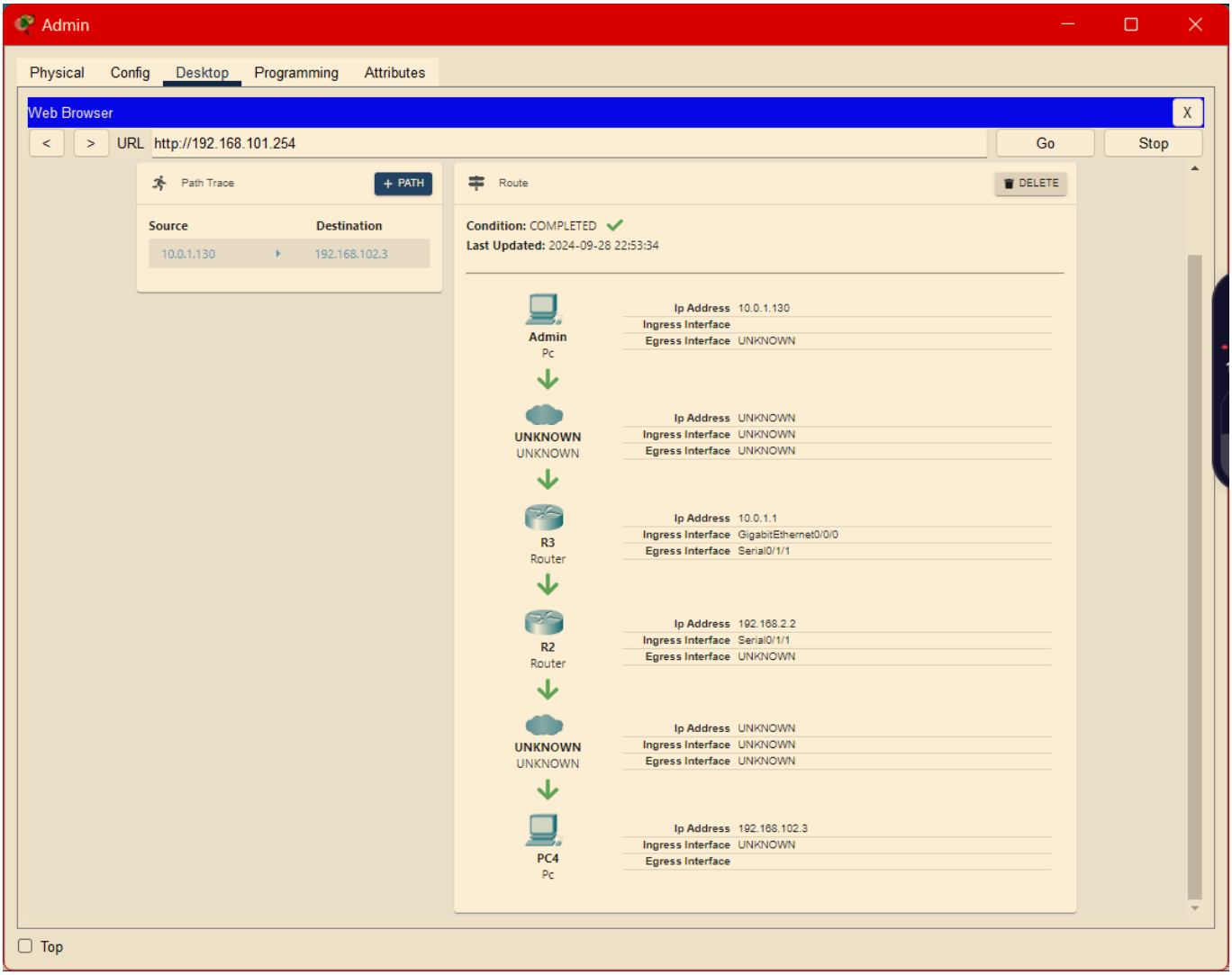


Path tracing

Seteamos el path tracing:

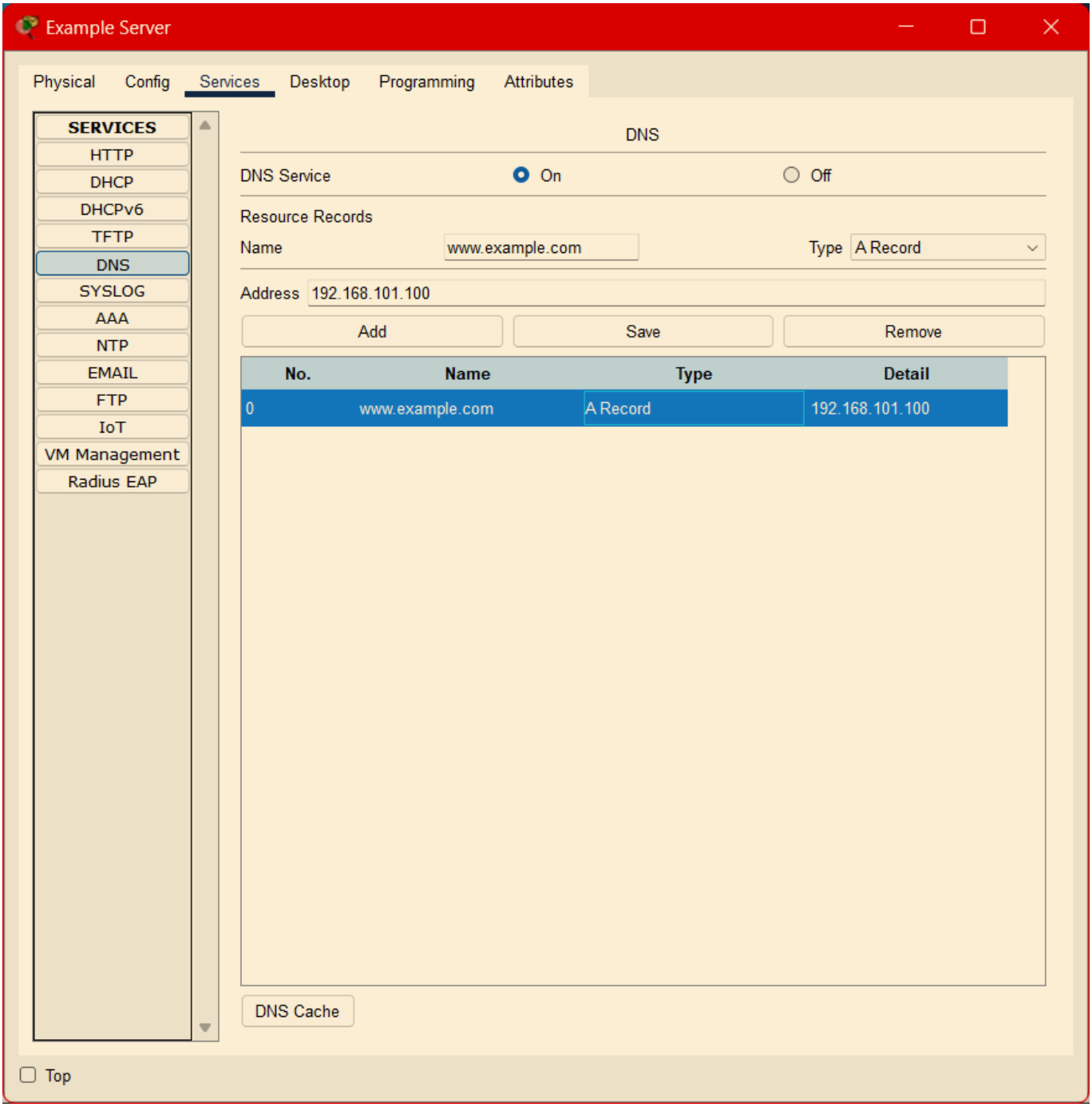


Observamos el path tracing:

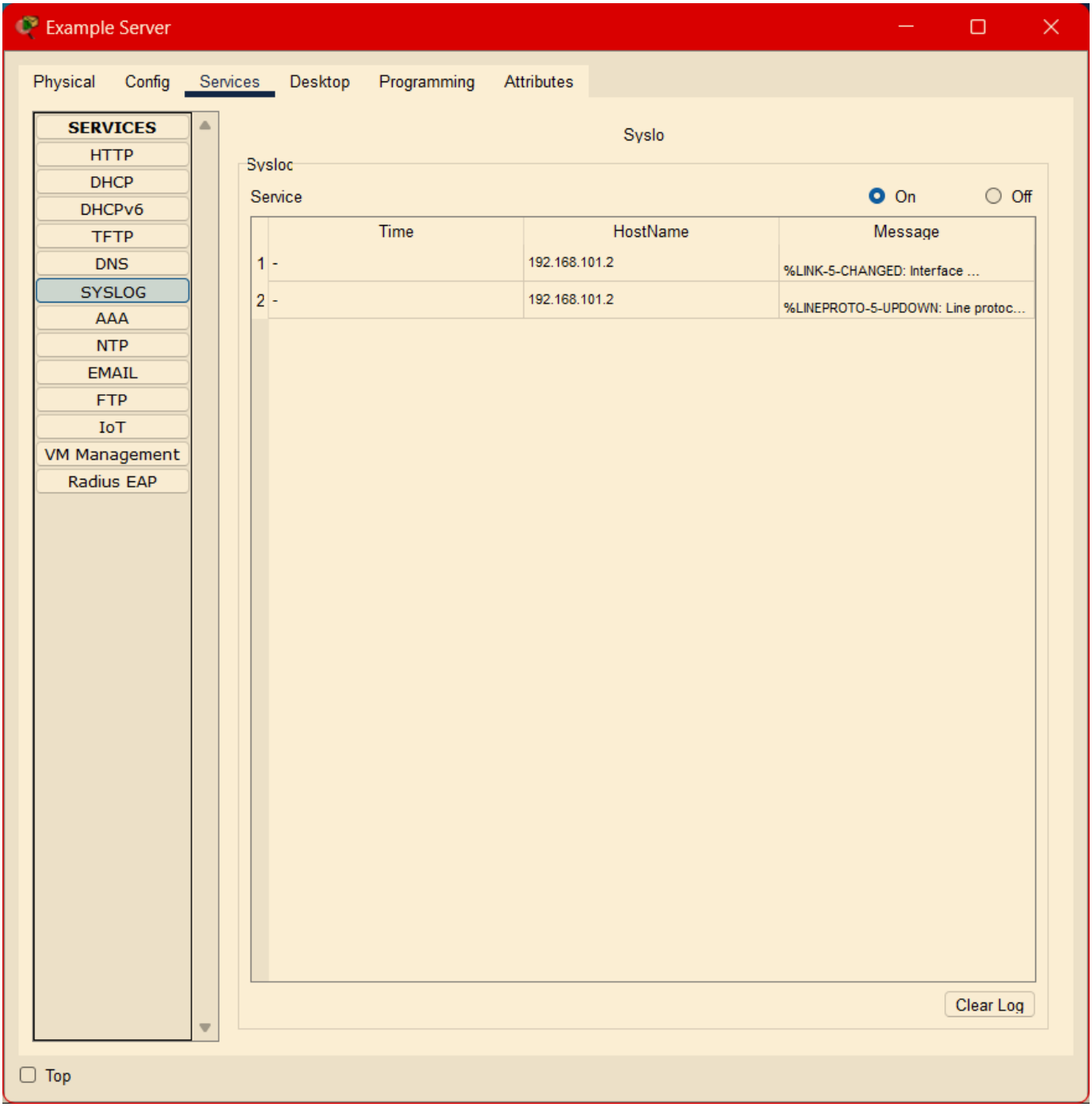


Usando un controlador SDN para configurar la red:

Vemos el DNS de Example Server:

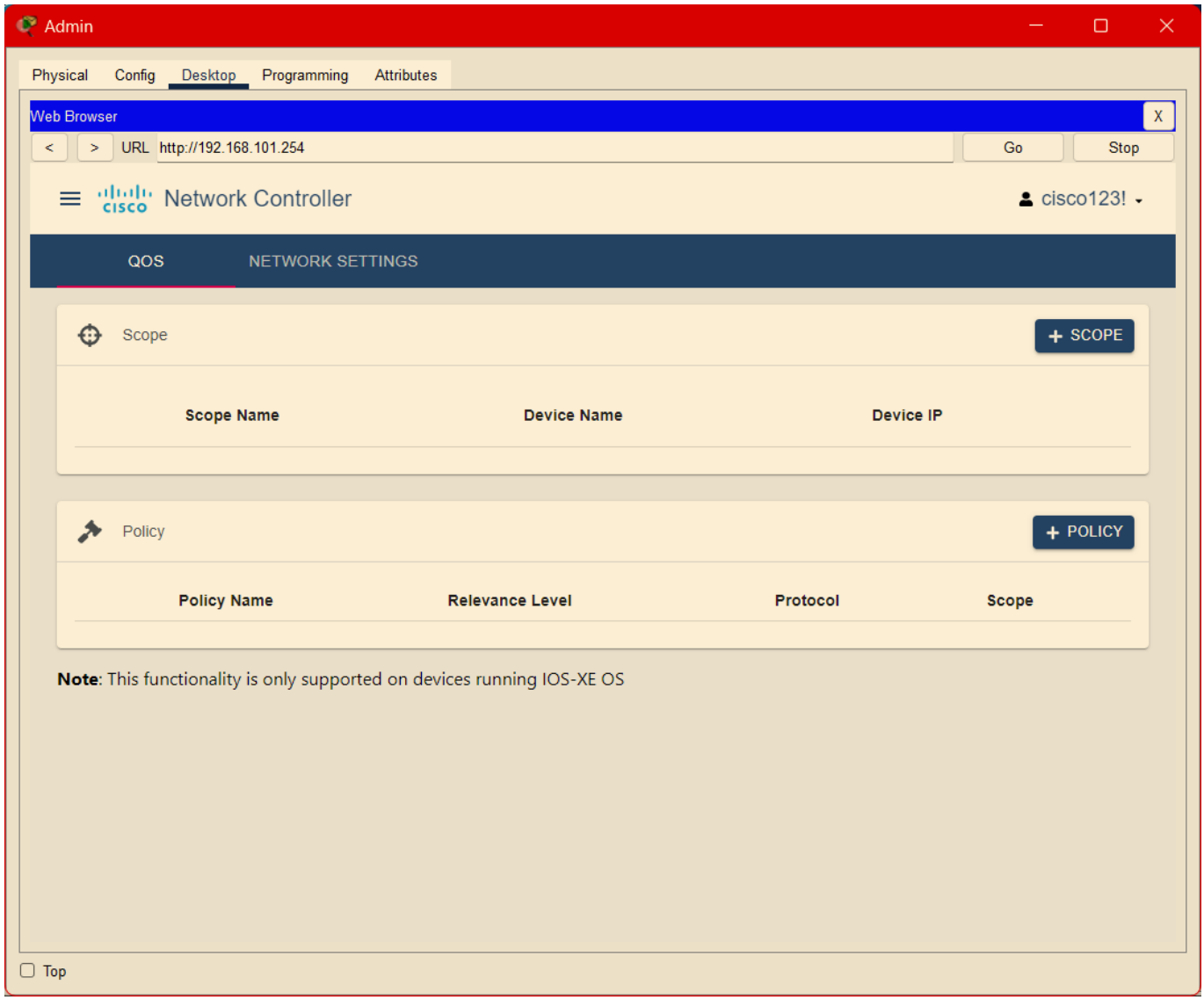


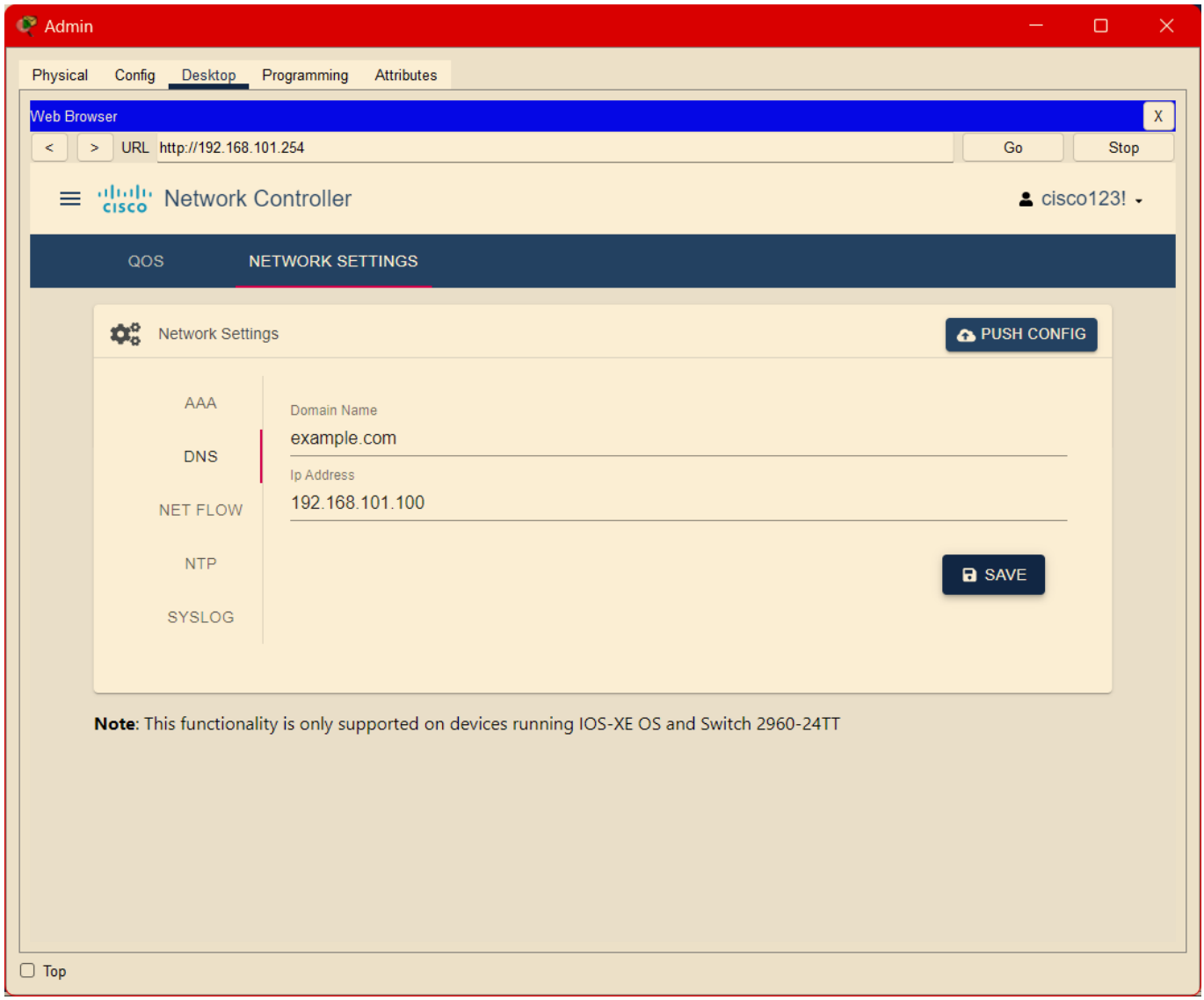
Notamos que Syslog está activo

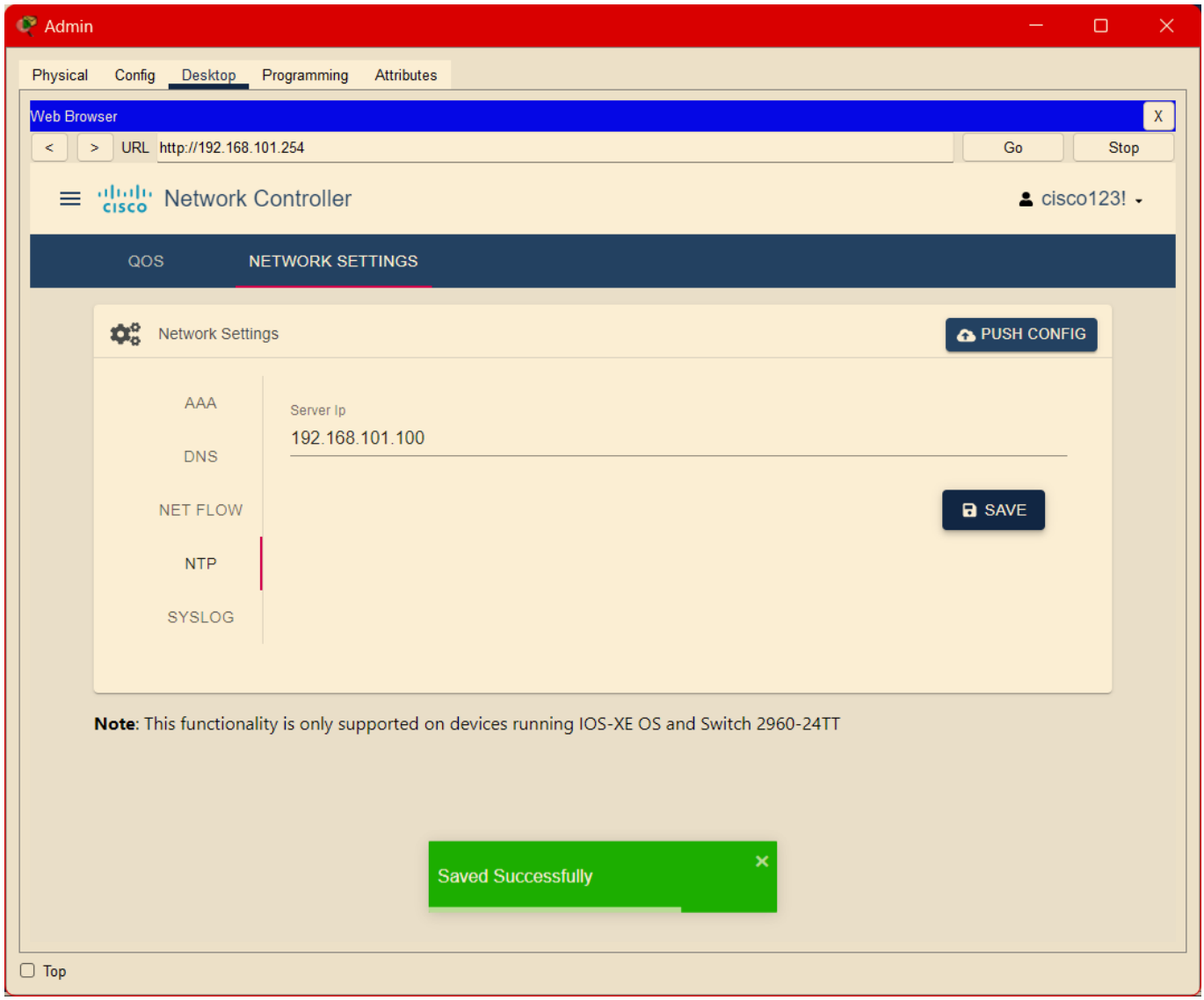


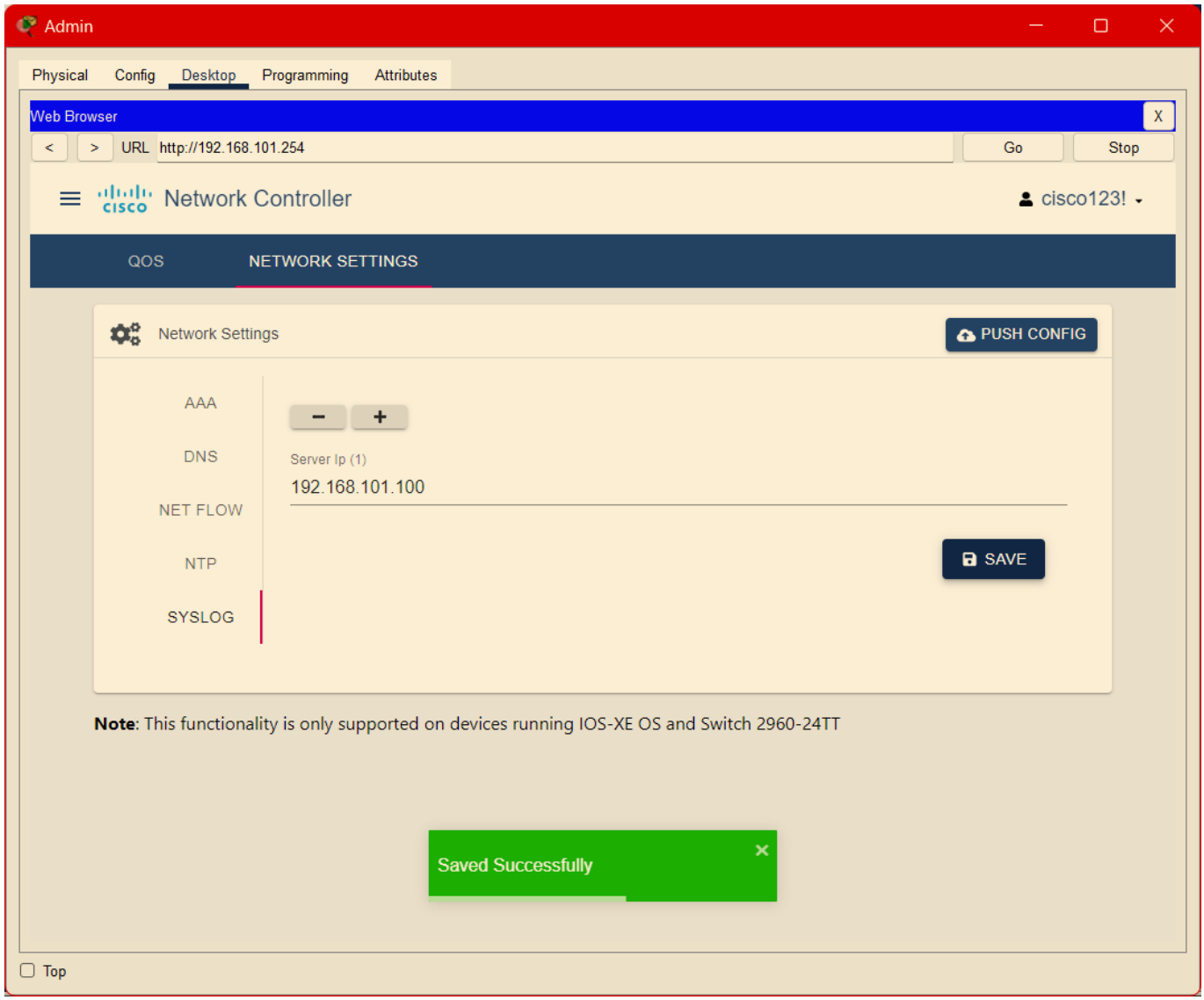
Y NTP también

Configuramos políticas de seguridad:

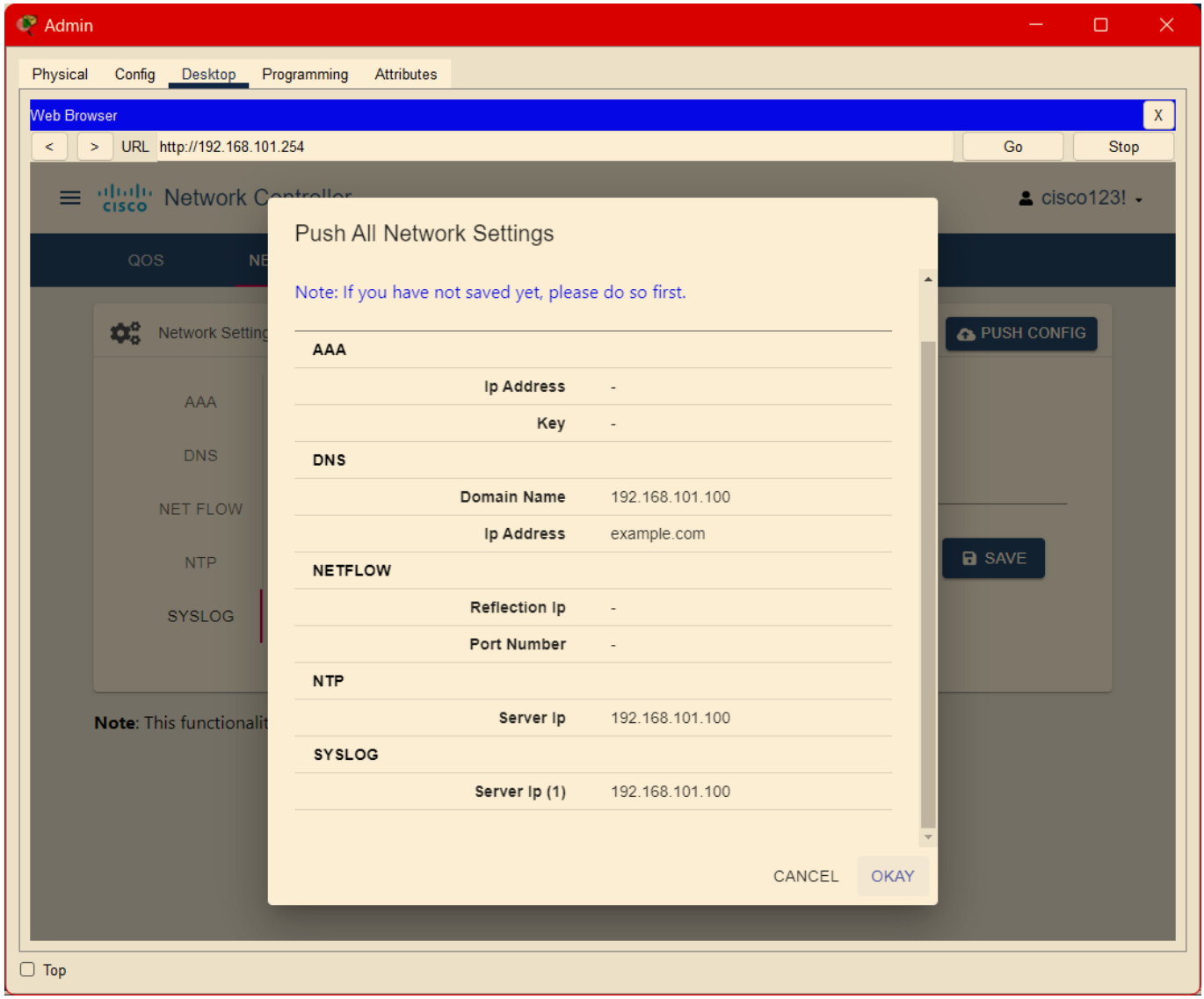

Admin
Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://192.168.101.254
Go
Stop
Network Controller
cisco123!
QOS
NETWORK SETTINGS
Scope
+ SCOPE
Scope Name
Device Name
Device IP
Policy
+ POLICY
Policy Name
Relevance Level
Protocol
Scope
Note: This functionality is only supported on devices running IOS-XE OS
Top


Admin
Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://192.168.101.254
Go
Stop
Network Controller
cisco123!
QOS
NETWORK SETTINGS
Network Settings
PUSH CONFIG
AAA
DNS
NET FLOW
NTP
SYSLOG
Domain Name
example.com
Ip Address
192.168.101.100
SAVE
Note: This functionality is only supported on devices running IOS-XE OS and Switch 2960-24TT
Top


Admin
Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://192.168.101.254
Go
Stop
Network Controller
cisco123!
QOS
NETWORK SETTINGS
Network Settings
PUSH CONFIG
AAA
DNS
NET FLOW
NTP
SYSLOG
Server Ip
192.168.101.100
SAVE
Note: This functionality is only supported on devices running IOS-XE OS and Switch 2960-24TT
Saved Successfully
Top


Admin
Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://192.168.101.254
Go
Stop
Network Controller
cisco123!
QOS
NETWORK SETTINGS
Network Settings
PUSH CONFIG
AAA
DNS
NET FLOW
NTP
SYSLOG
Server Ip (1)
192.168.101.100
SAVE
Note: This functionality is only supported on devices running IOS-XE OS and Switch 2960-24TT
Saved Successfully
Top

Pusheamos configuraciones:



Verificamos la configuración:


```
R1>enable
R1#show run | begin ip domain
ip domain-name example.com
ip name-server 192.168.101.100
```

Luego vemos las asociaciones de NTP, el clock y el logging, y finalmente cambiamos el estado del interfaz Serial0/1/0 a administratively down y luego a up.

```
R1#show ntp associations

address         ref clock       st   when     poll    reach  delay          offset
disp
*~192.168.101.100127.127.1.1     1    1        16      177    0.00           0.00
```

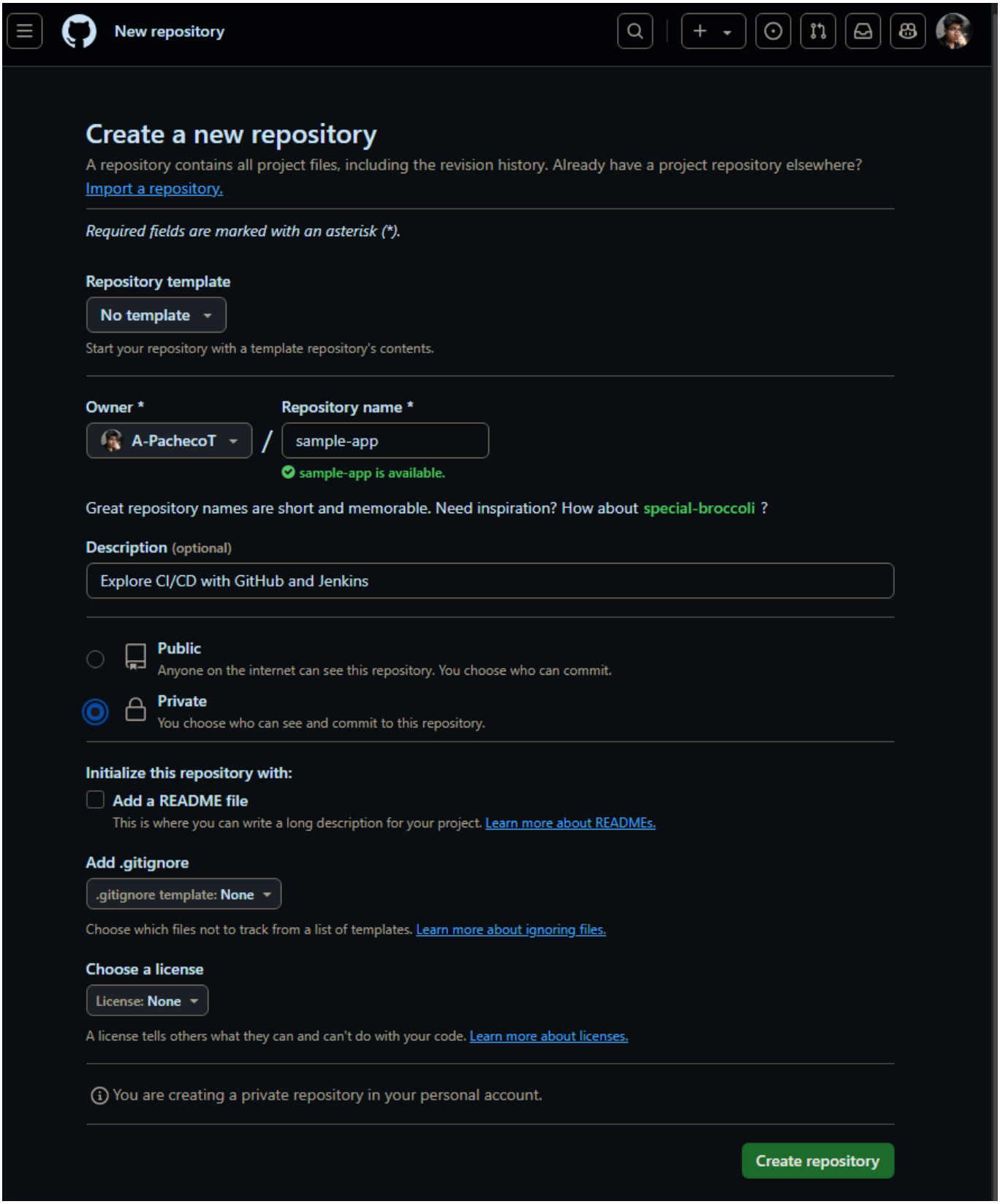
```
0.12
 * sys.peer, # selected, + candidate, - outlyer, x falseticker, ~ configured
R1#show clock
18:30:10.789 UTC Thu Jun 11 2020
R1#show run | include logging
logging 192.168.101.100
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface s0/1/0
R1(config-if)#shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to down

18:30:34: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.2.1 on Serial0/1/0 from FULL to
DOWN, Neighbor Down: Interface down or detached

R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

R1(config-if)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console
%SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 192.168.101.100 port 514 started -
CLI initiated
```

Part 2: Build a CI/CD Pipeline Using Jenkins

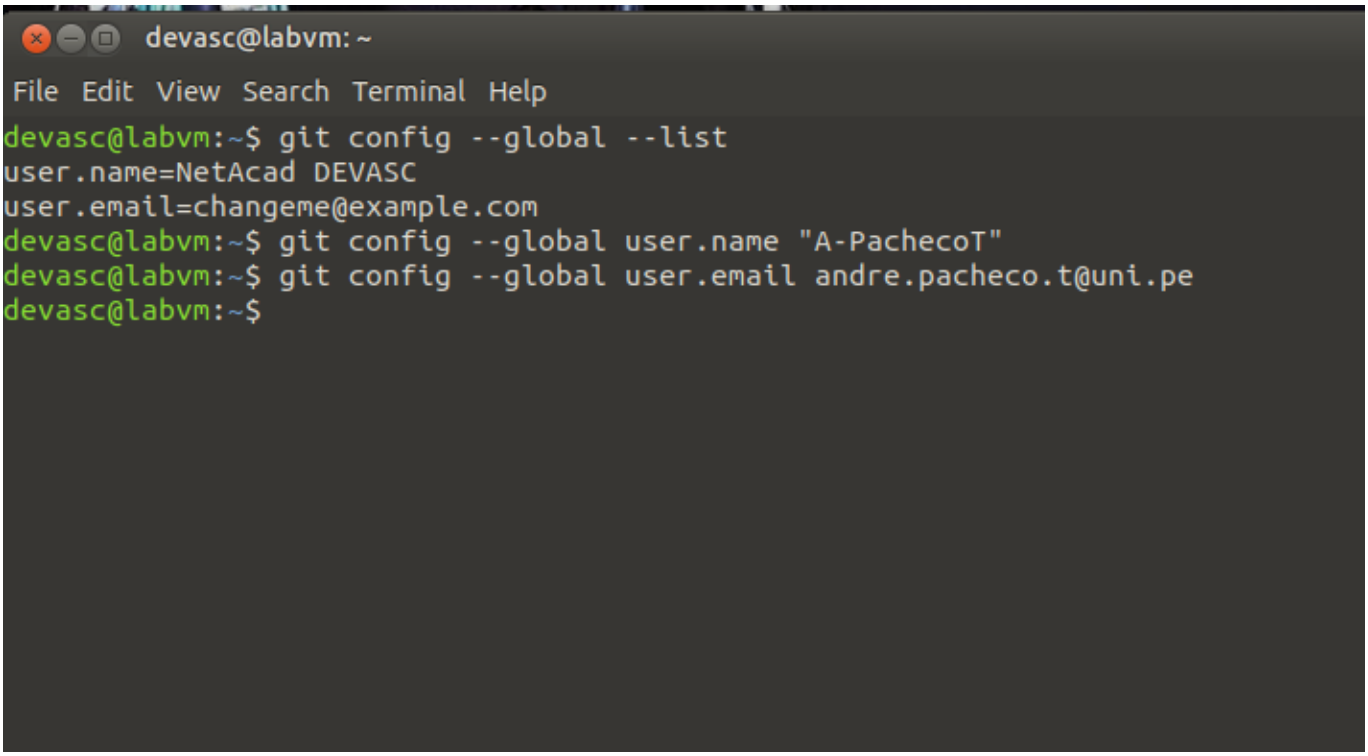
Part 1: Launch the DEVASC VM

Part 2: Commit the Sample App to Git

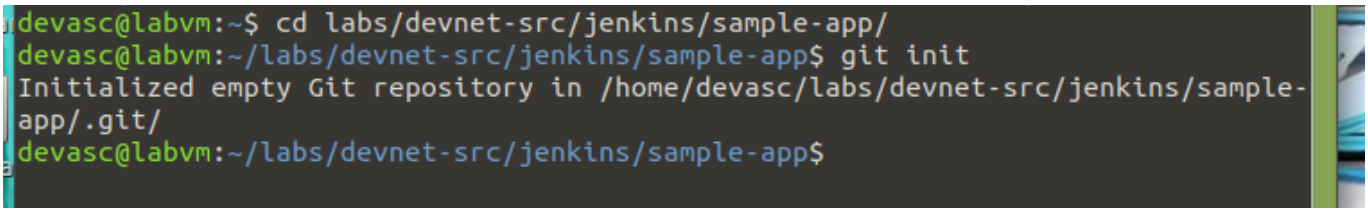
Creando repositorio en GitHub:



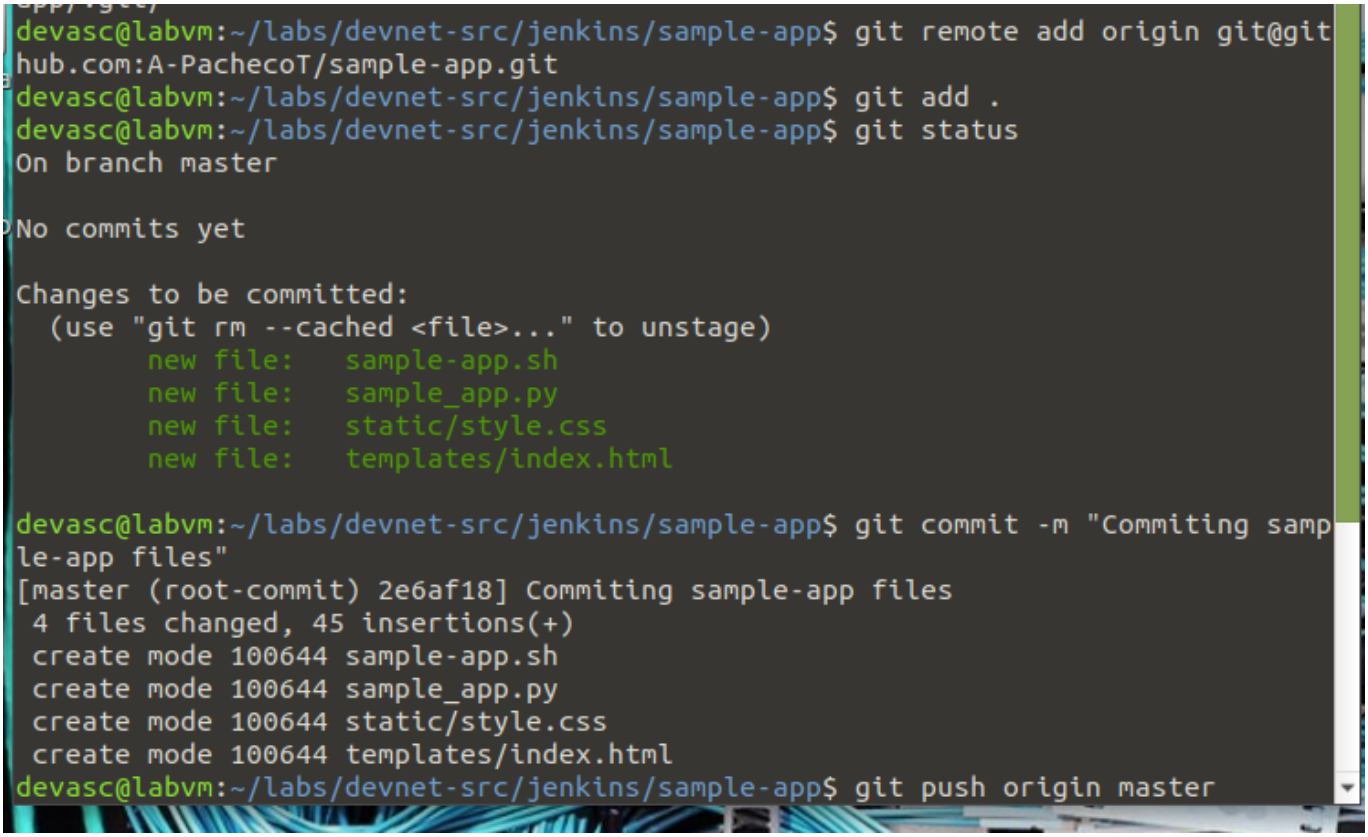
Configurando credenciales en la máquina virtual:



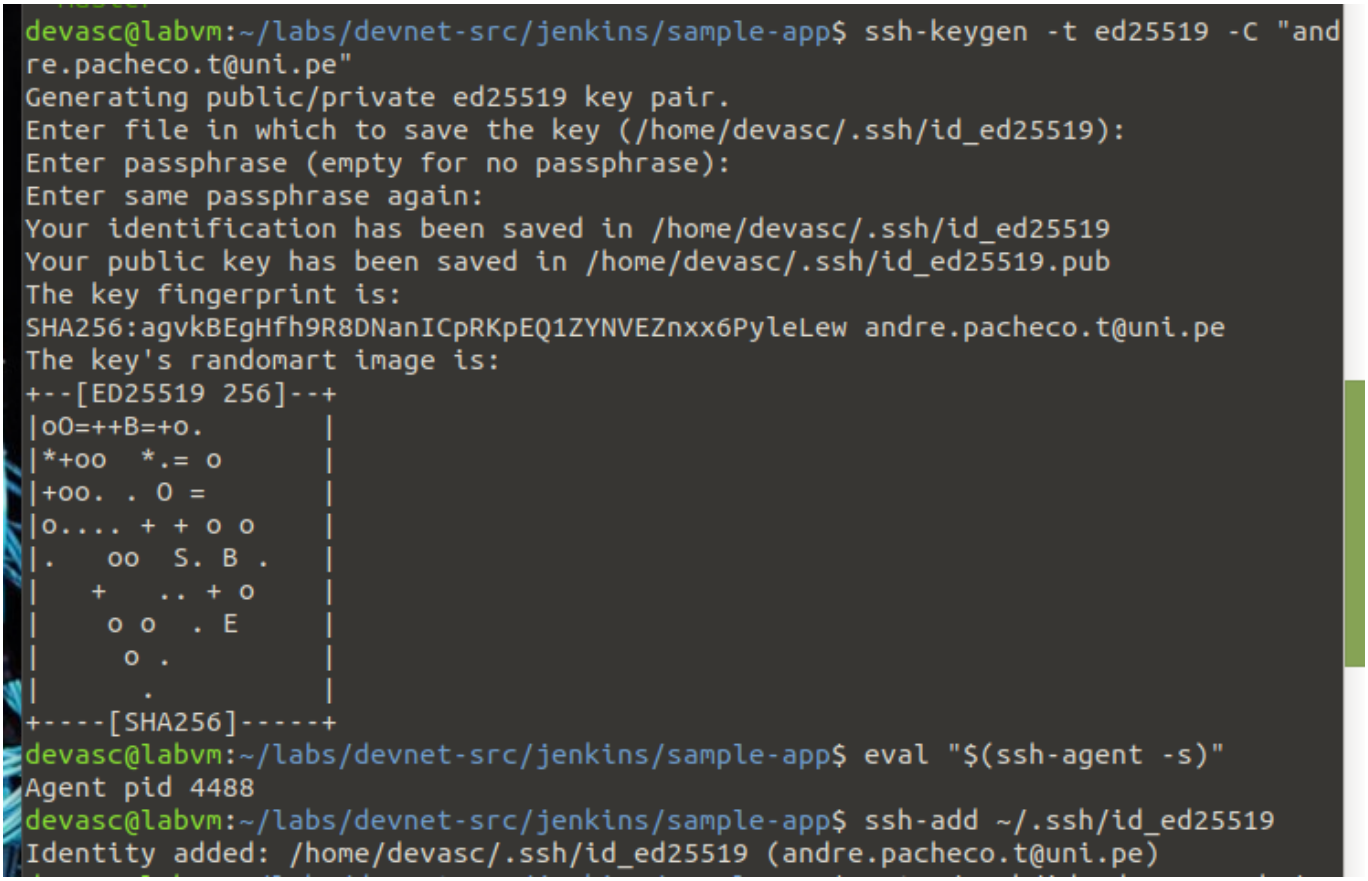
Inicializando repositorio local:



Enlazando con el repositorio remoto y agregando los archivos con add, commiteando y puseando a master:



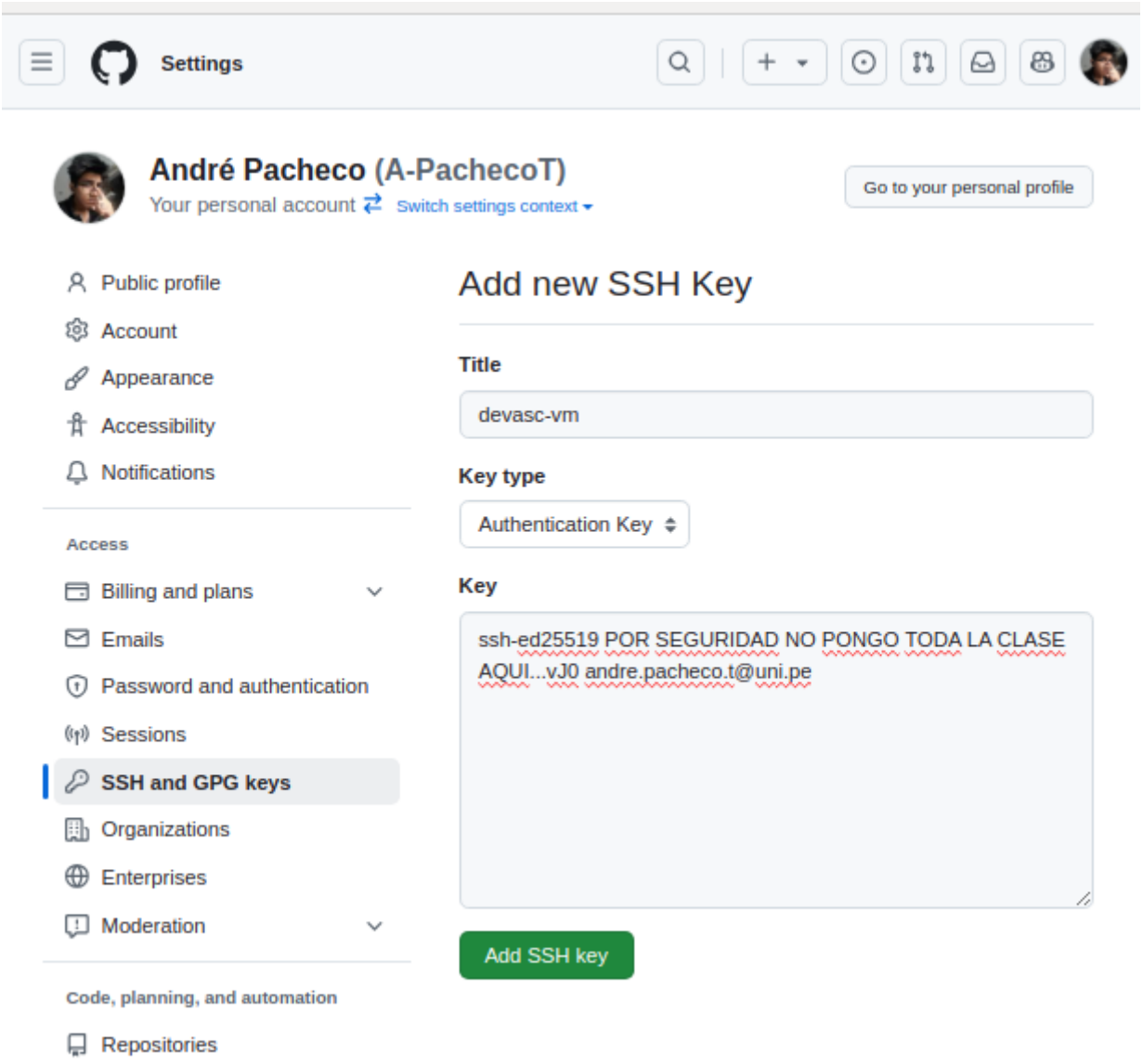
El uso de contraseñas para la autenticación es más fácil de implementar, pero Github deprecó el uso de contraseñas para la autenticación por lo que se uso claves ssh. Por ello tengo que crear una clave ssh:



con

```
cat ~/.ssh/id_rsa.pub
```

vemos la clave. Esta clave se añade a las llaves de mi cuenta de github:



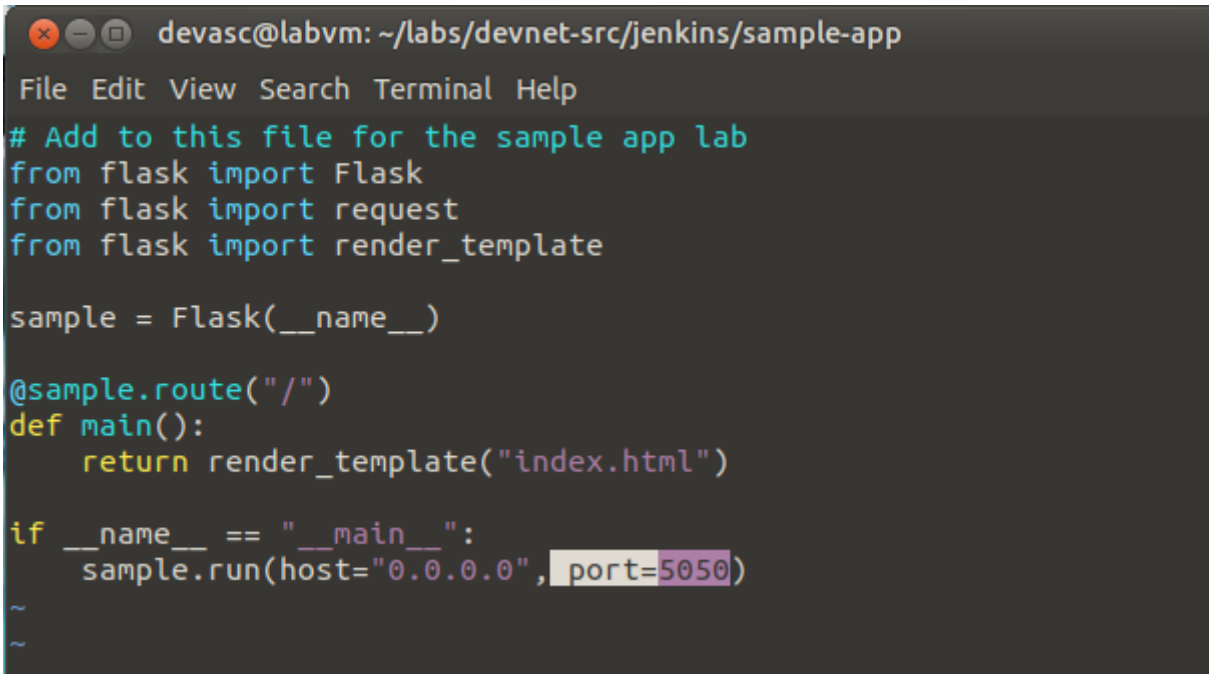
Finalmente puedo pushear a mi repositorio remoto:

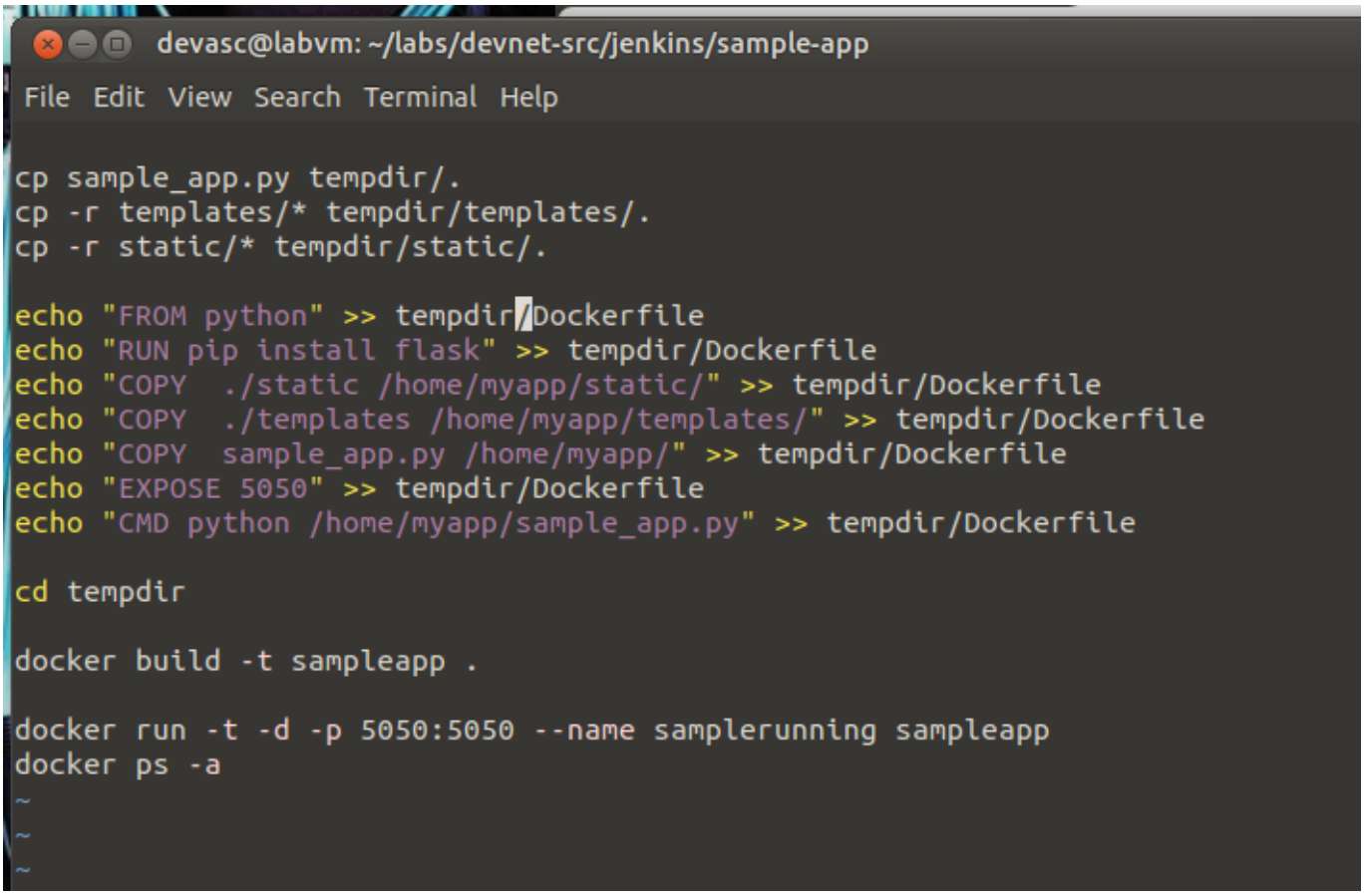
```
devasc@labvm:~/labs/devnet-src/jenkins/sample-app$ git push origin master
Enumerating objects: 8, done.
Counting objects: 100% (8/8), done.
Delta compression using up to 2 threads
Compressing objects: 100% (5/5), done.
Writing objects: 100% (8/8), 1.03 KiB | 1.03 MiB/s, done.
Total 8 (delta 0), reused 0 (delta 0)
To github.com:A-PachecoT/sample-app.git
 * [new branch]      master -> master
```

Part 3: Modify the Sample App and Push Changes to Git

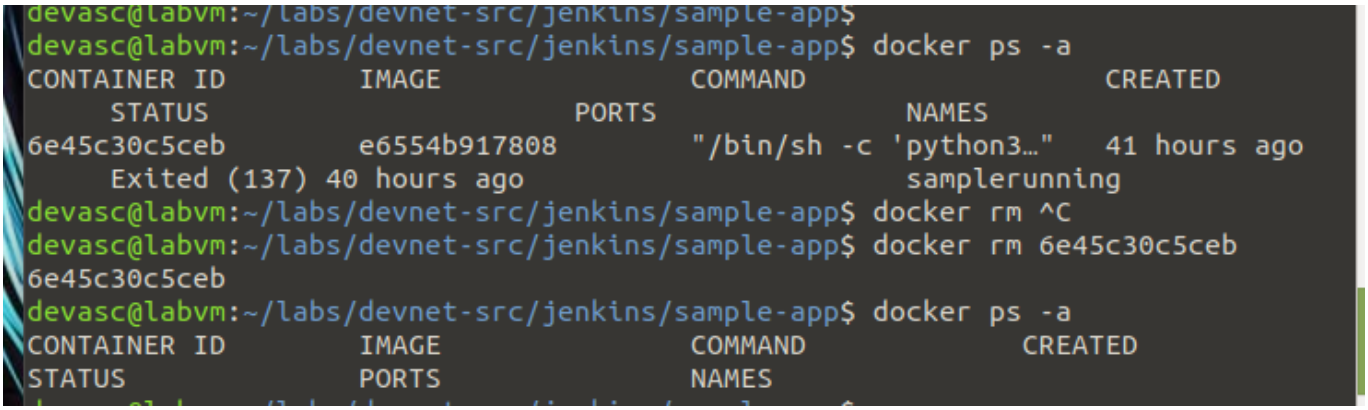
Ahora cambiemos achivos...

Se cambia el puerto en el .py y .hs:

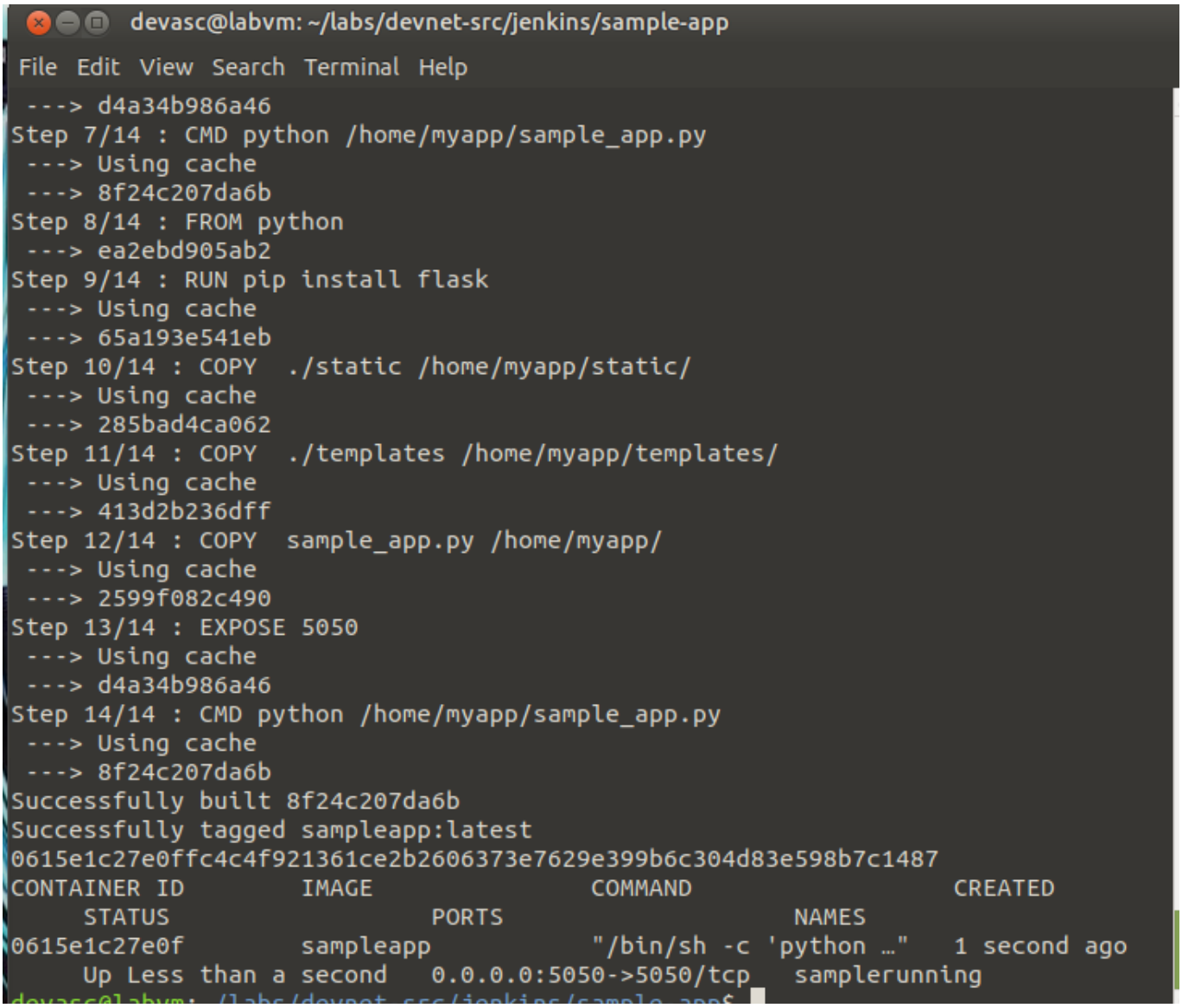




Tenía el contenedor creado así que tuve que eliminar y volver a crearlo:

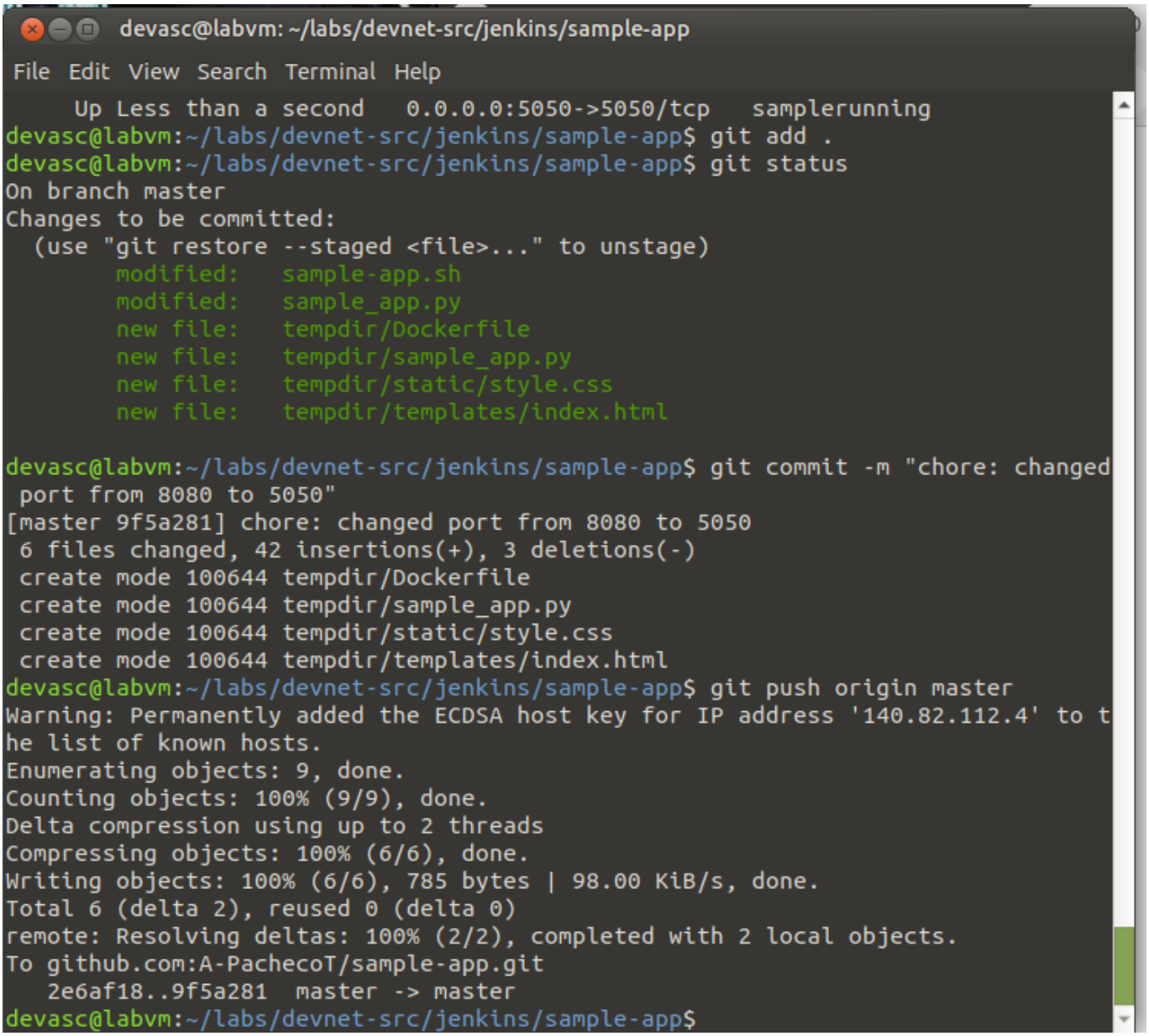


Y vuelvo a ejecutar el .sh:

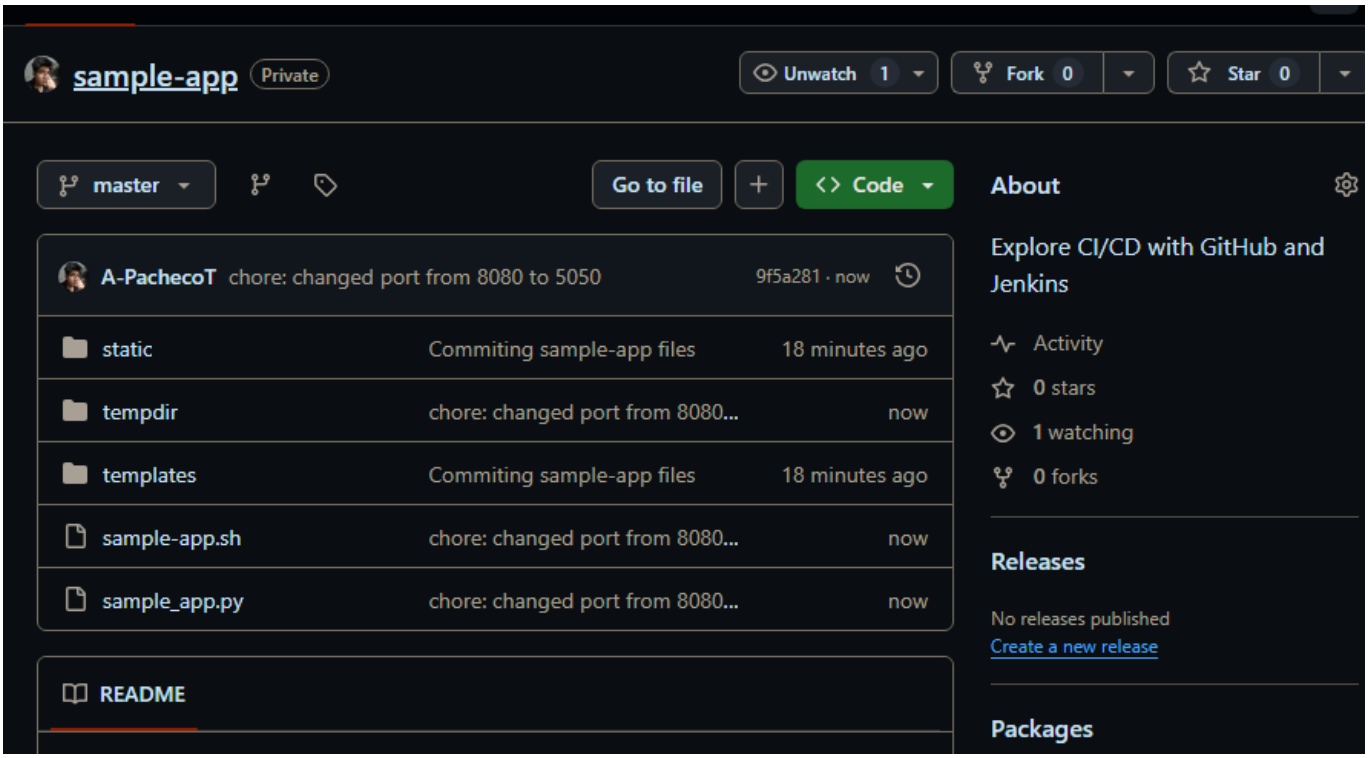


Listo, ya tenemos el contenedor funcionando con el nuevo puerto.

Por ultimo subimos los cambios a mi repositorio remoto:



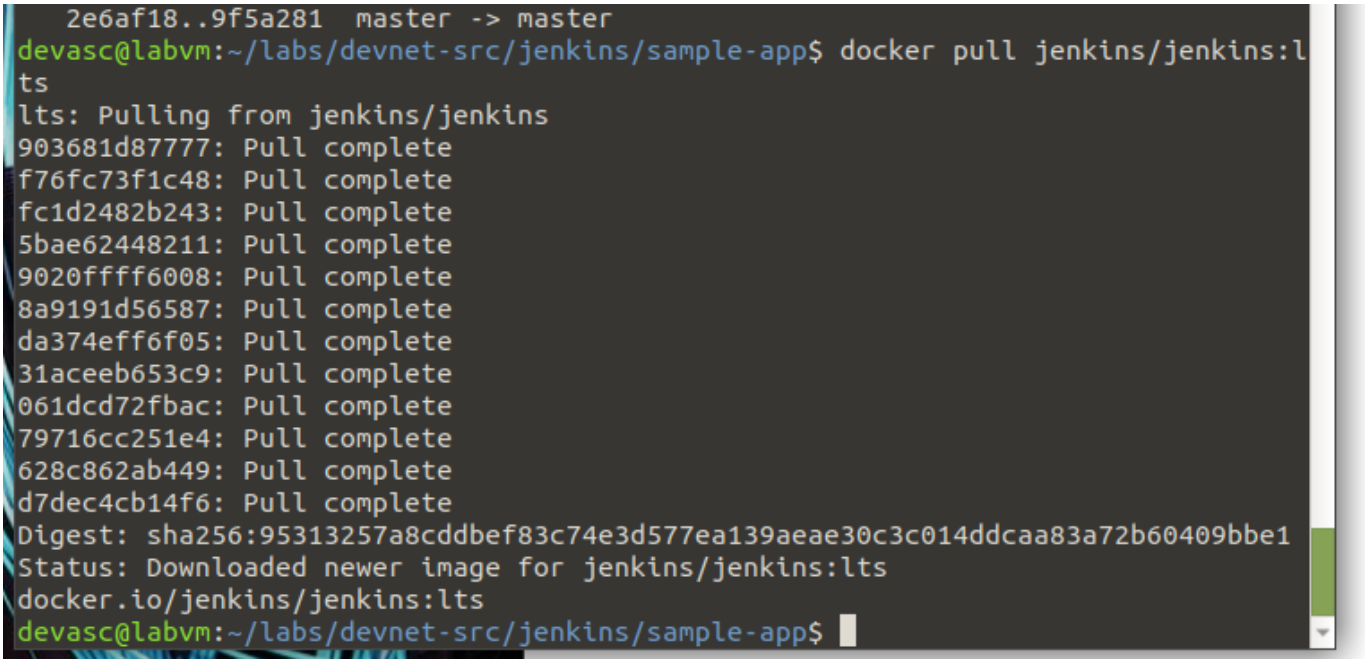
Efectivamente se pushearon los cambios.



Part 4: Download and Run the Jenkins Docker Image

Descargamos la imagen lts de jenkins con el comando:

```
docker pull jenkins/jenkins:lts
```

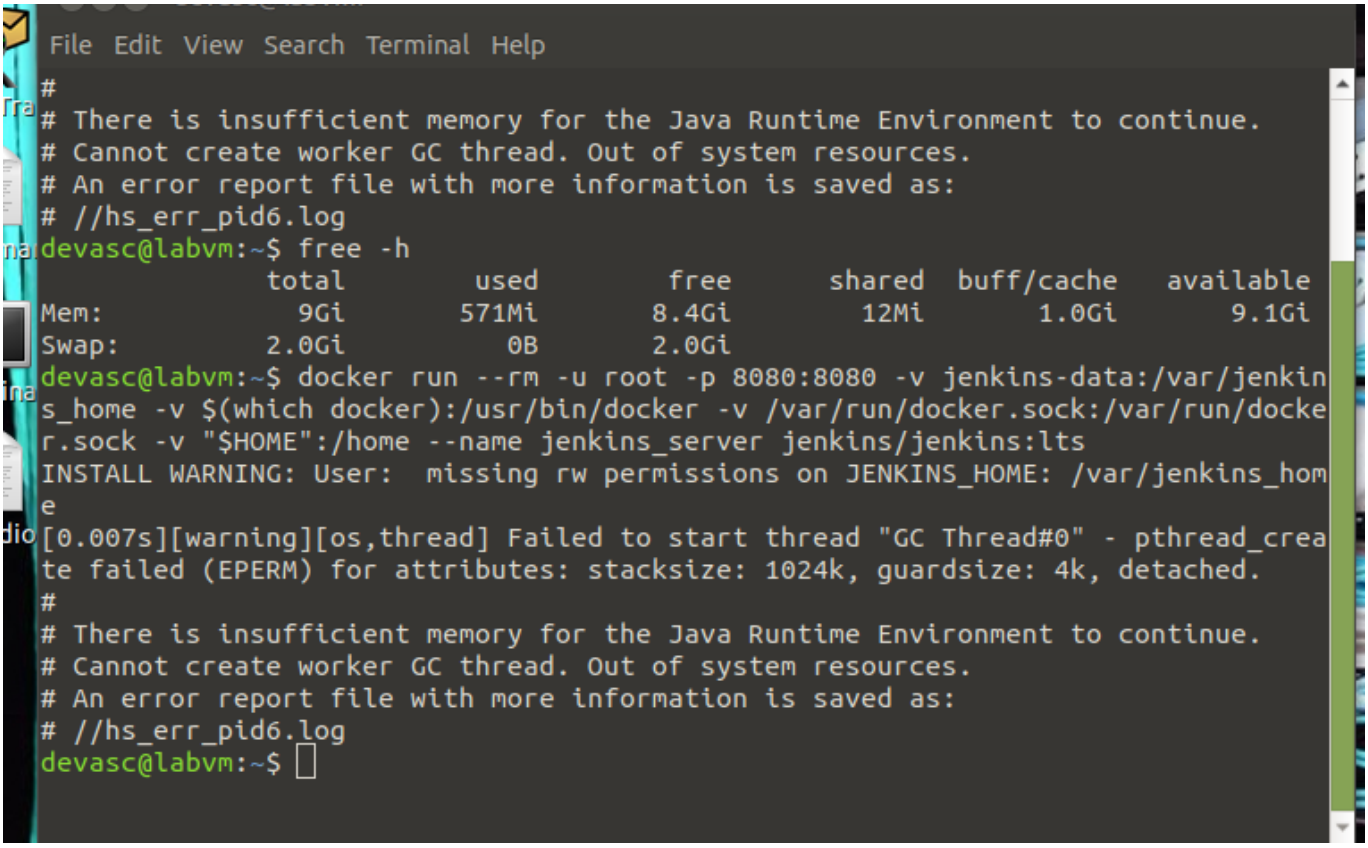


Empezamos el contenedor con el comando:

```
docker run --rm -u root -p 8080:8080 -v jenkins-data:/var/jenkins_home -v $(which
docker):/usr/bin/docker -v /var/run/docker.sock:/var/run/docker.sock -v
```

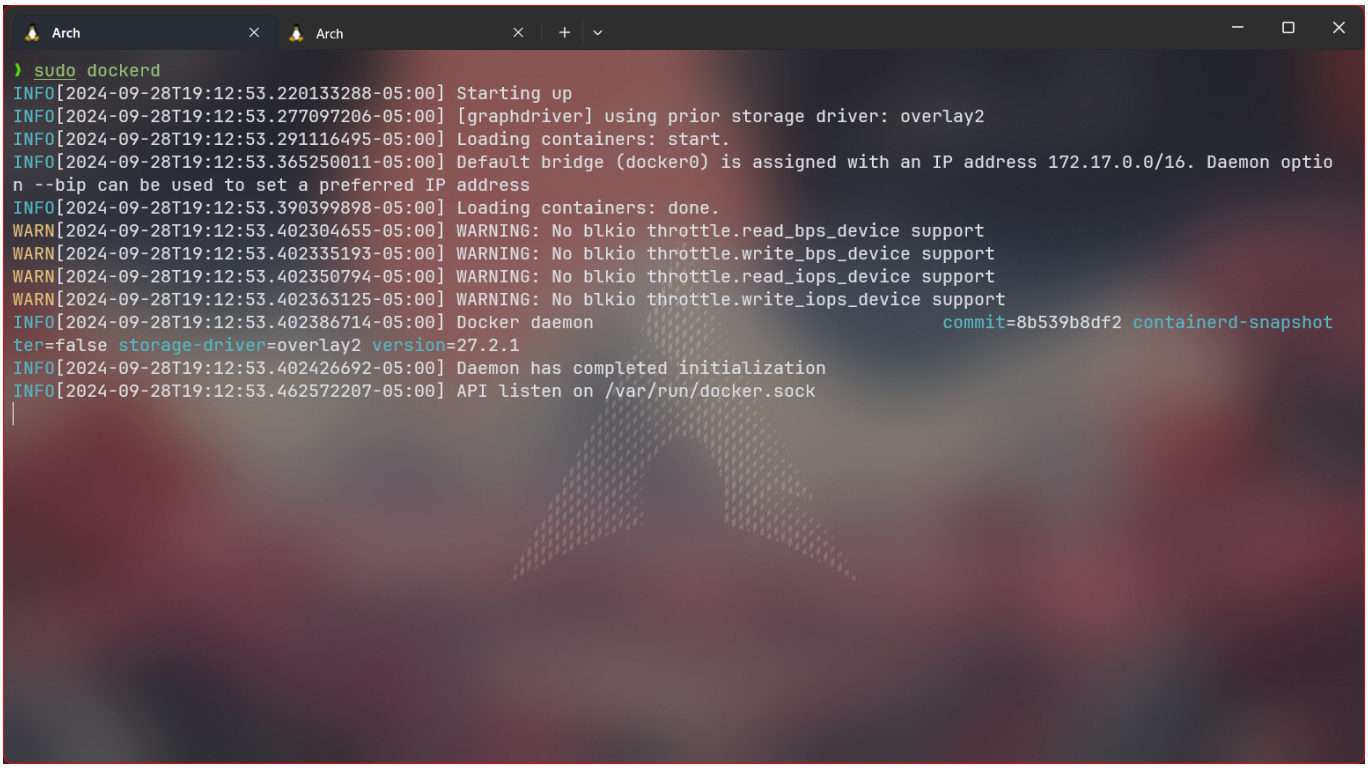
```
  "$HOME":/home --name jenkins_server jenkins/jenkins:lts
```

Tuve un error al iniciar el contenedor, por falta de memoria RAM; pero por más que le puse +10GB de RAM no me dejaba iniciar el contenedor.

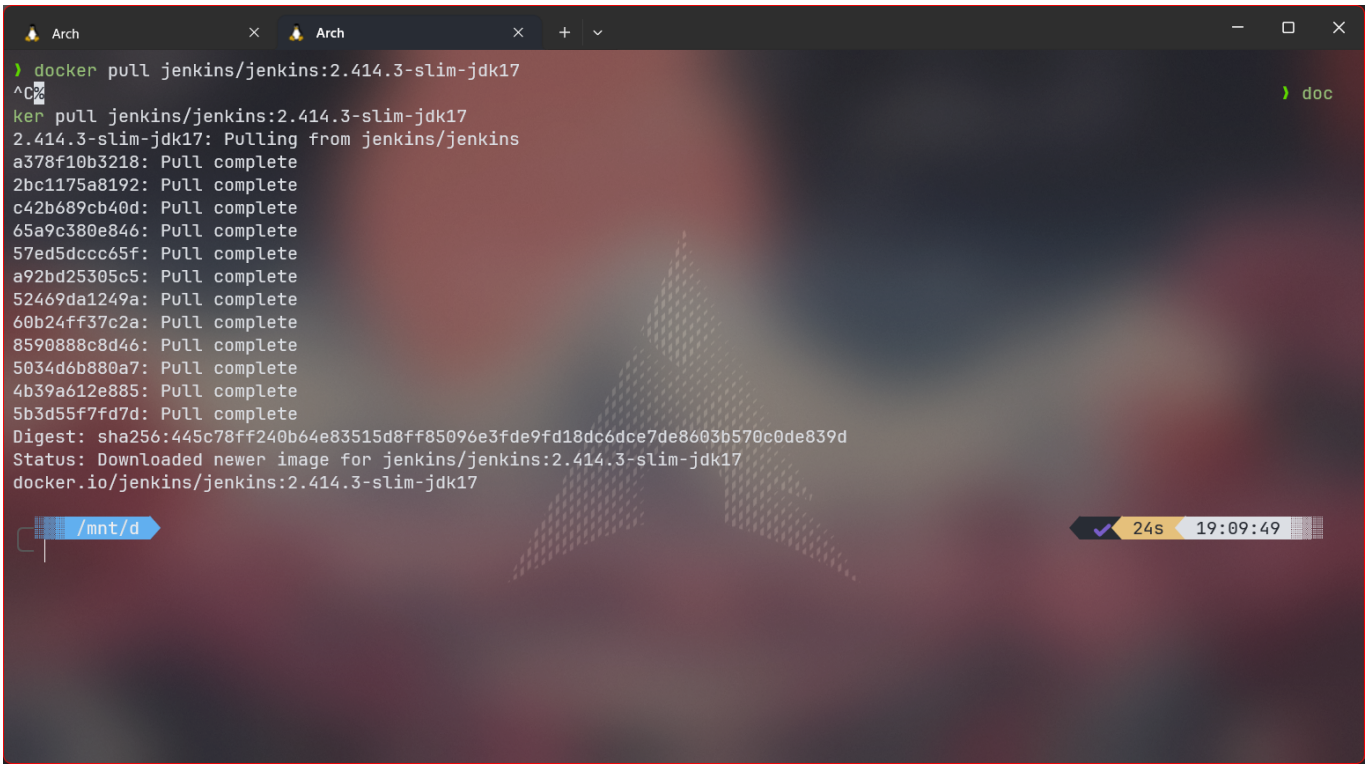


Luego de insistentes errores al seguir con el laboratorio, decidí proseguir usando el Windows Subsytem for Linux (WSL). En particular estoy usando Arch Linux WSL.

Prendo docker daemon

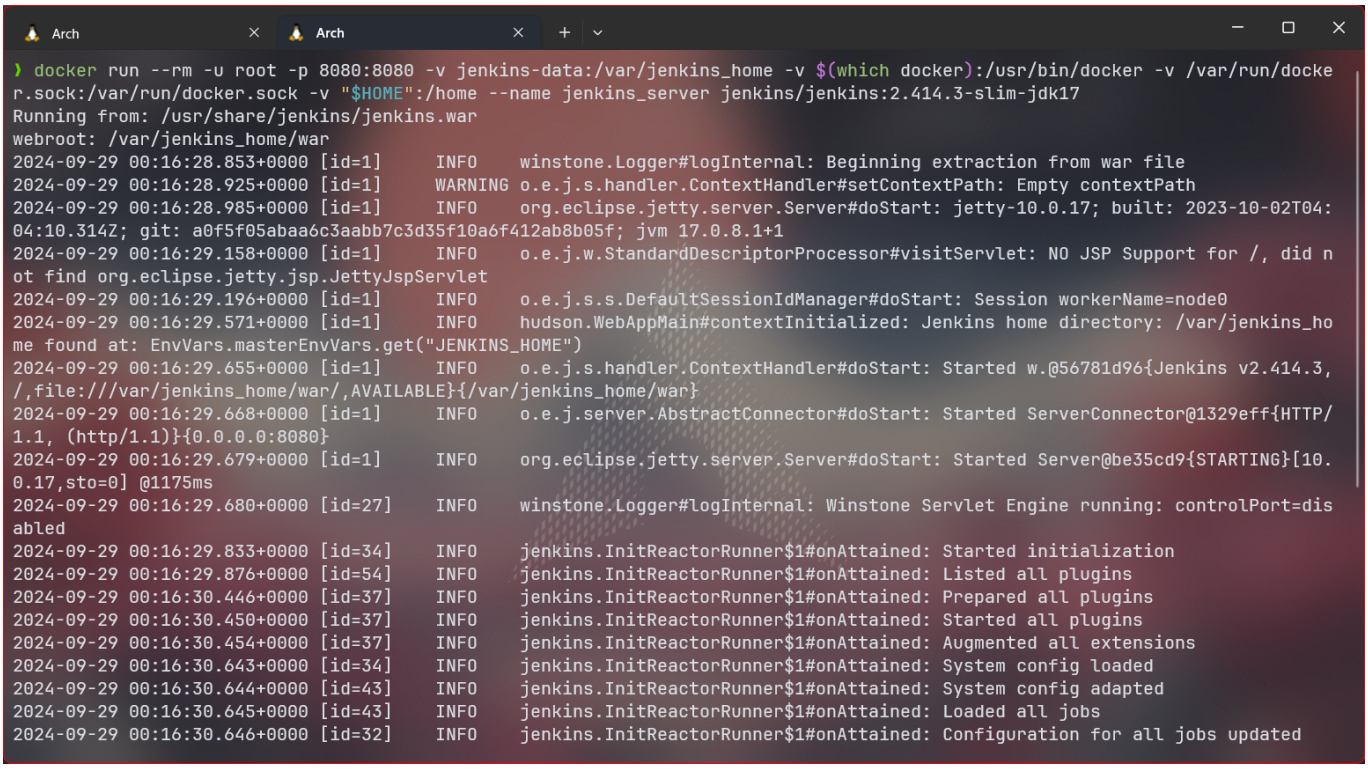


Descargo la imagen de jenkins 2.414.3-slim-jdk17 que es compatible con la clave ssh con la que enlazé mi repositorio remoto:

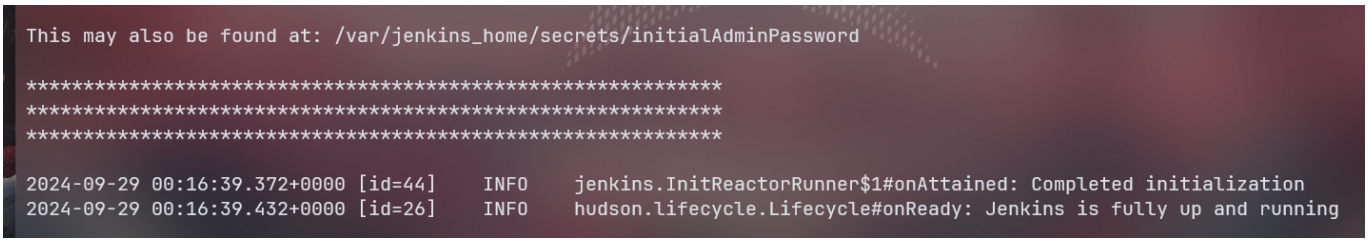


Ejecuto el contenedor con el comando:

```
docker run --rm -u root -p 8080:8080 -v jenkins-data:/var/jenkins_home -v $(which docker):/usr/bin/docker -v /var/run/docker.sock:/var/run/docker.sock -v "$HOME":/home --name jenkins_server jenkins/jenkins:2.414.3-slim-jdk17
```

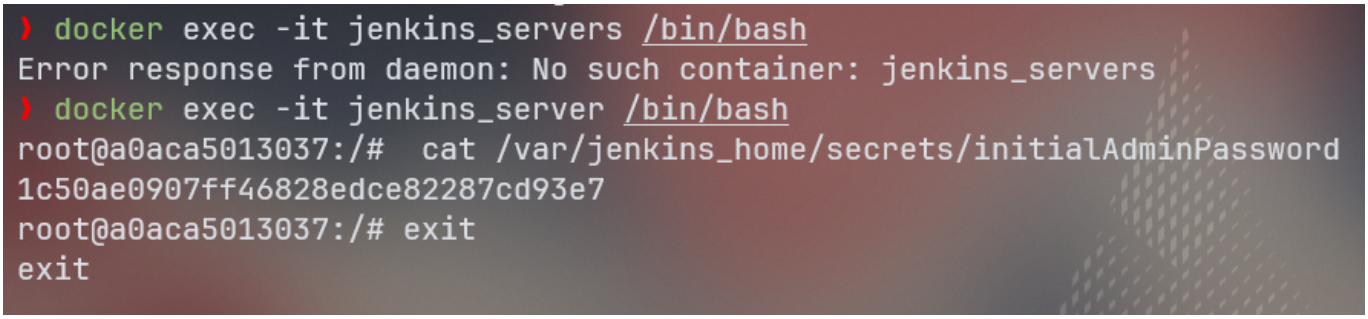


Ahora sí me salió el mensaje con la contraseña:



1c50ae0907ff46828edce82287cd93e7

También me cersioro que esa es la contraseña al entrar al contenedor:



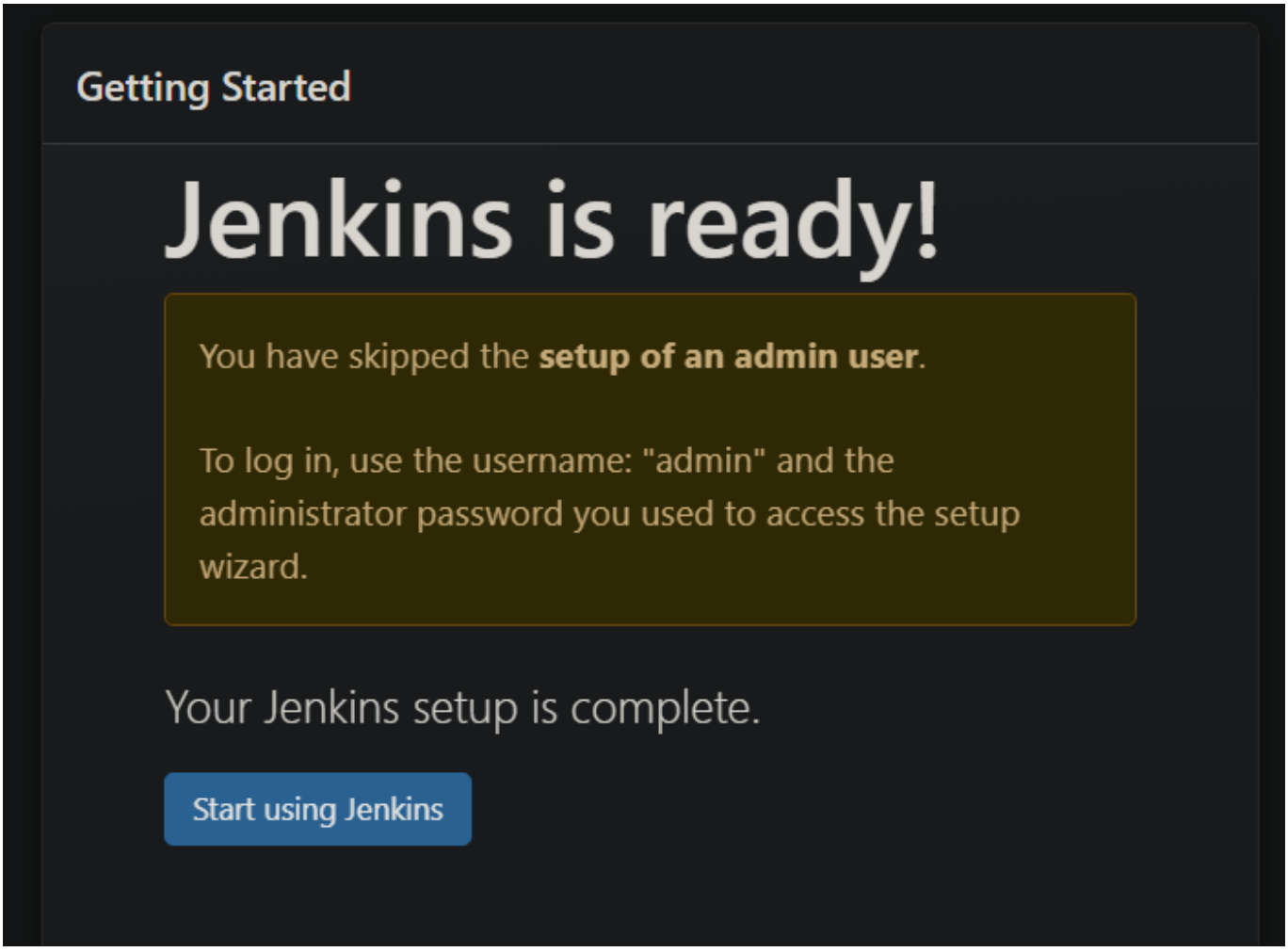
Configuramos jenkins:

Entramos con la contraseña que obtuvimos en localhost:8080

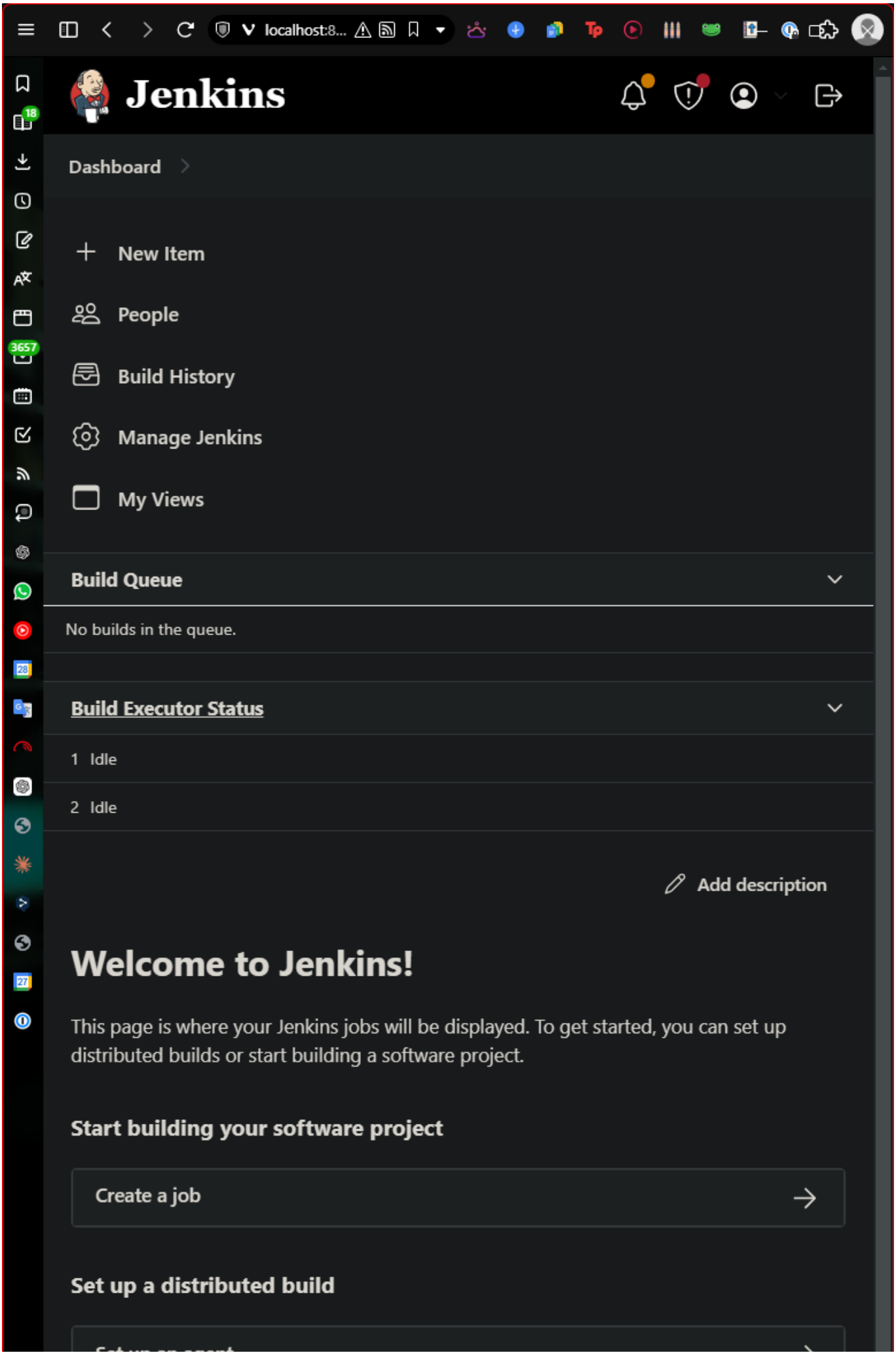
Instalamos los plugins sugeridos.

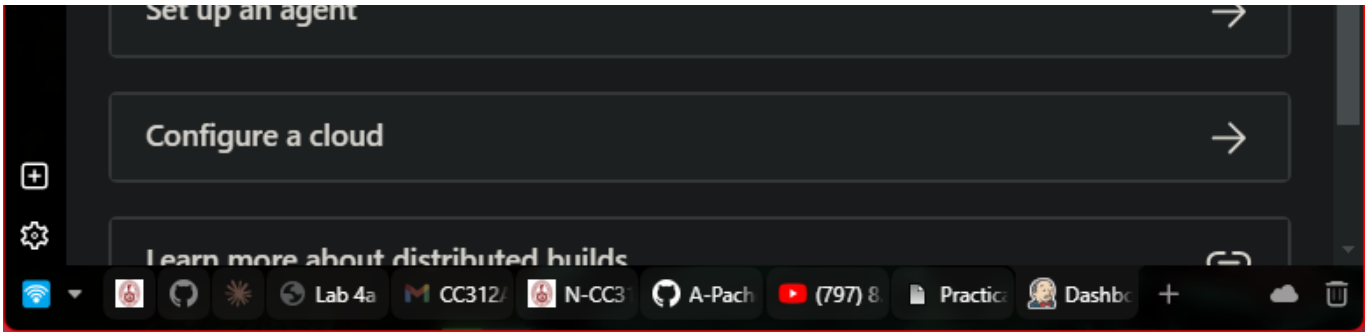
Skipeamos crear un usuario.

Dejé la config como estaba.



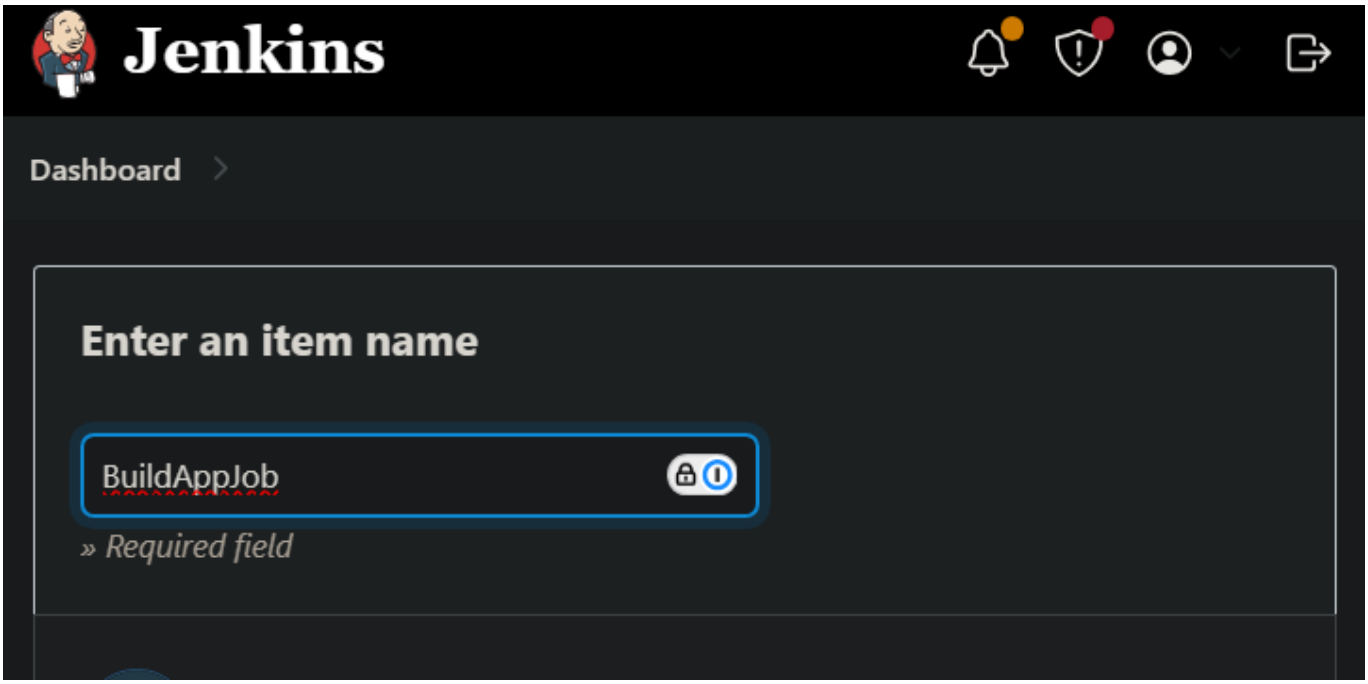
Listo! Ya estamos en el panel de jenkins.


localhost:8...
Jenkins
Dashboard
New Item
People
Build History
Manage Jenkins
My Views
Build Queue
No builds in the queue.
Build Executor Status
1 Idle
2 Idle
Add description
Welcome to Jenkins!
This page is where your Jenkins jobs will be displayed. To get started, you can set up distributed builds or start building a software project.
Start building your software project
Create a job
Set up a distributed build

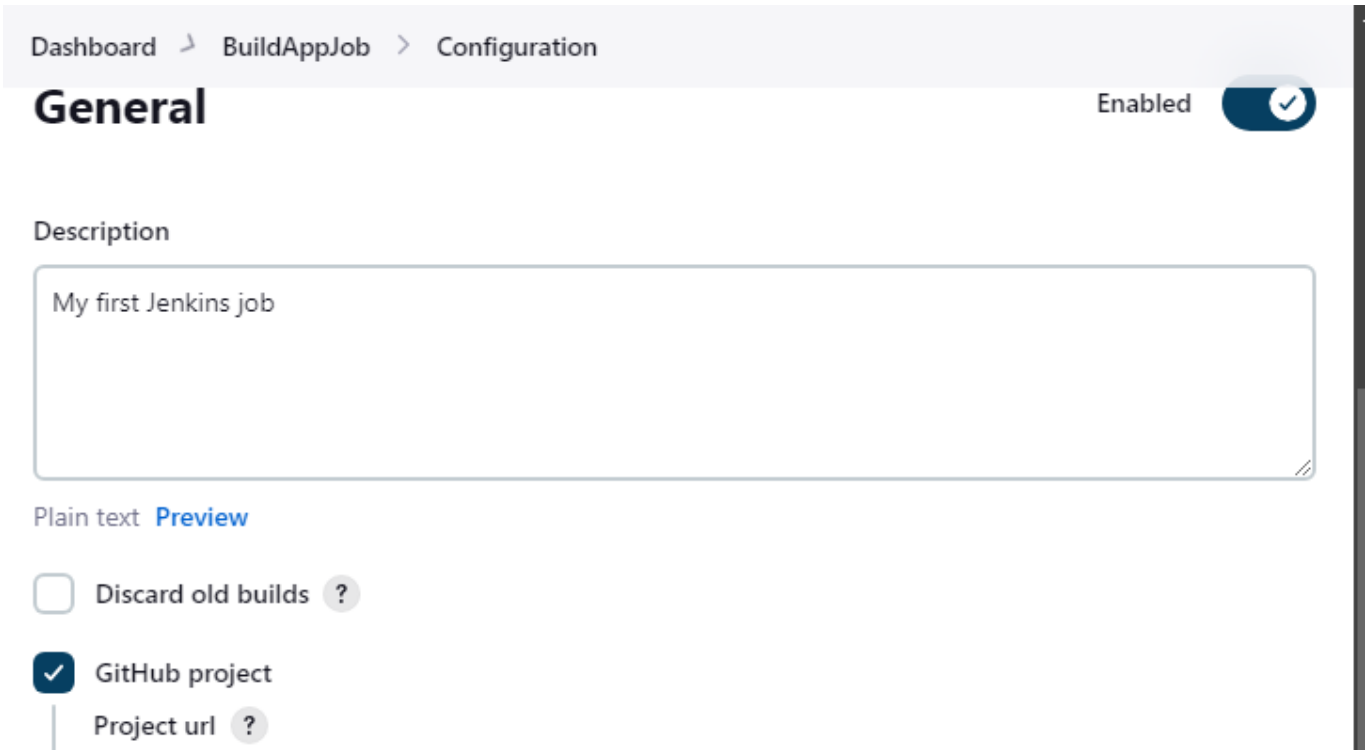


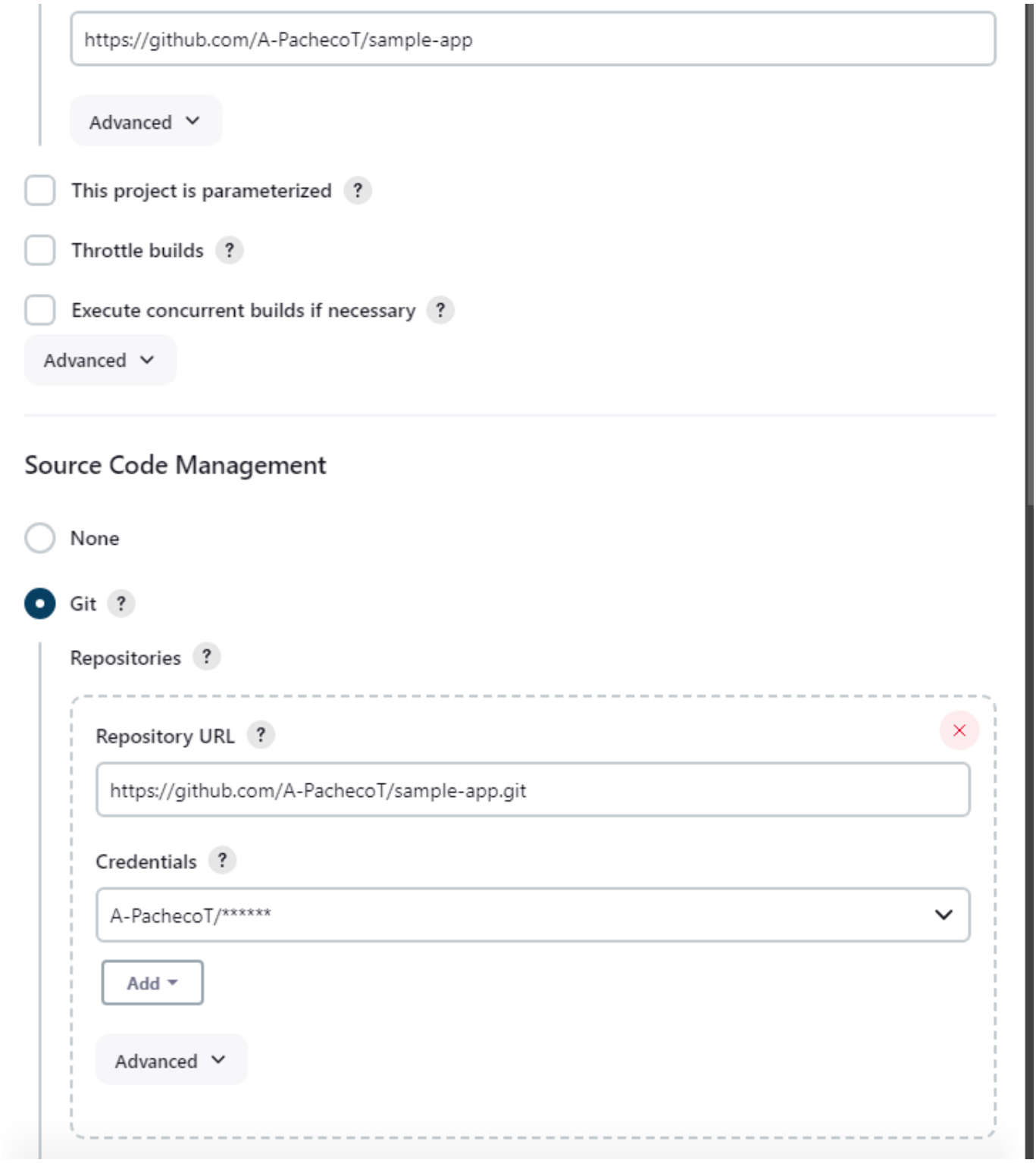
Usamos jenkins para construir nuestra app:

Creamos un job BuildAppJob. Se eligió un Freestyle project.

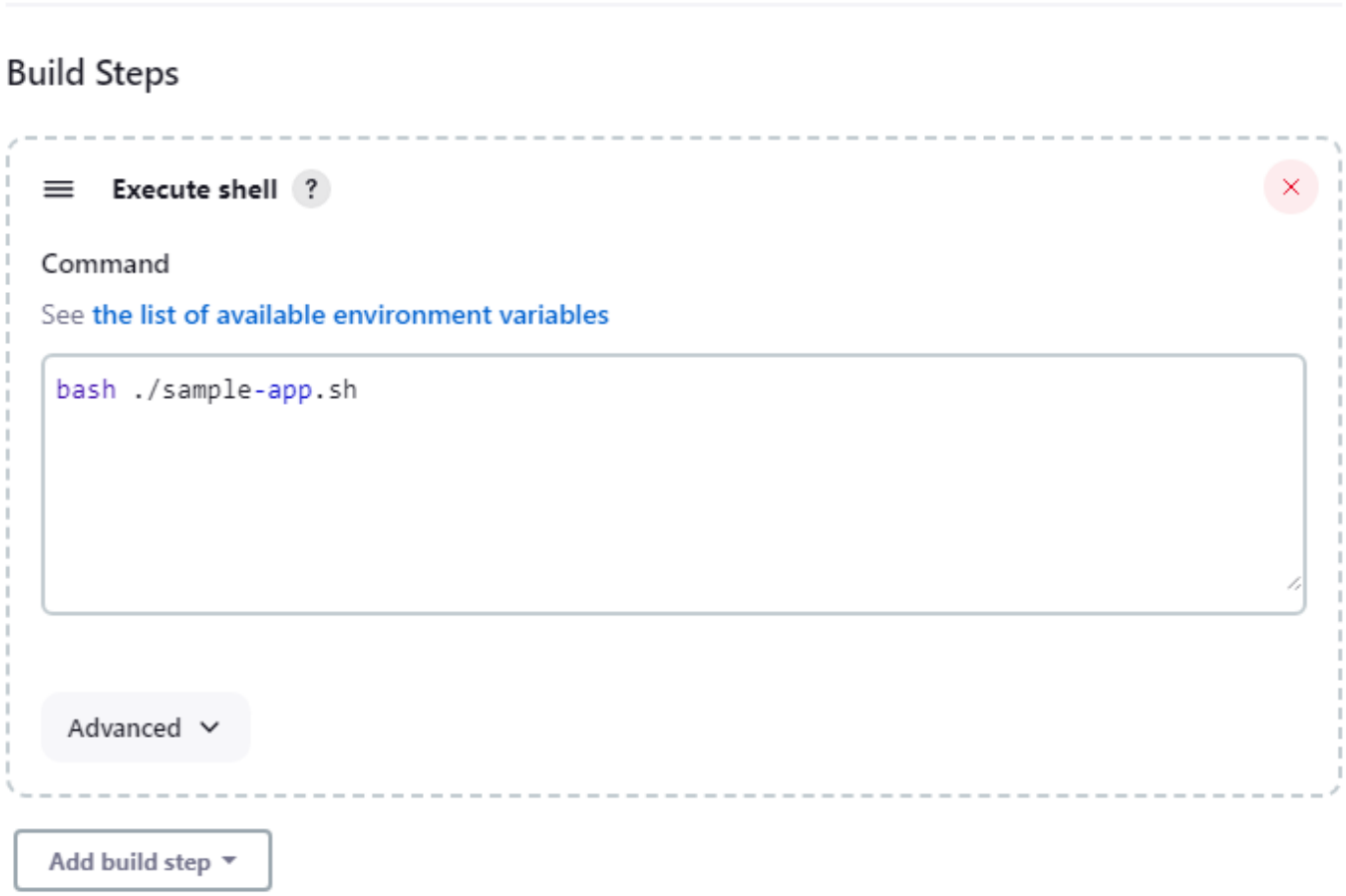


Se establecieron el link del repositorio remoto y las credenciales de github en la configuración del job.





Se agregó un Build Step de tipo Execute shell con el comando de construcción del contenedor:



Se guardó la configuración.

Usamos jenkins para testear la construcción de nuestra app:

Le di a Build Now. Salida de consola:

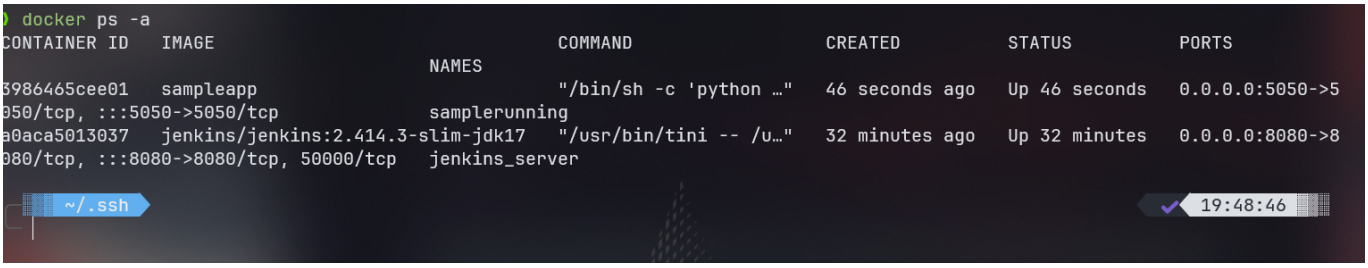
Console Output

Progress:

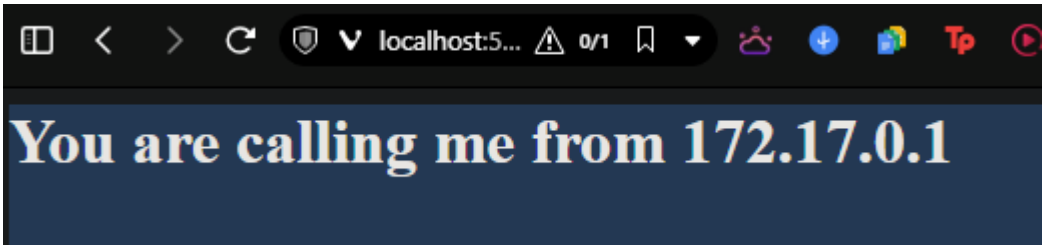
```
Started by user admin
Running as SYSTEM
Building in workspace /var/jenkins_home/workspace/BuildAppJob
The recommended git tool is: NONE
using credential 1dc7f1d7-da96-4caa-ab09-c19131bd89e3
Cloning the remote Git repository
Cloning repository https://github.com/A-PachecoT/sample-app.git
 > git init /var/jenkins_home/workspace/BuildAppJob # timeout=10
Fetching upstream changes from https://github.com/A-PachecoT/sample-app.git
 > git --version # timeout=10
 > git --version # 'git version 2.39.2'
using GIT_ASKPASS to set credentials
 > git fetch --tags --force --progress -- https://github.com/A-PachecoT/sample-app.git
+refs/heads/*:refs/remotes/origin/* # timeout=10
 > git config remote.origin.url https://github.com/A-PachecoT/sample-app.git # timeout=10
 > git config --add remote.origin.fetch +refs/heads/*:refs/remotes/origin/* # timeout=10
Avoid second fetch
 > git rev-parse refs/remotes/origin/master^{commit} # timeout=10
Checking out Revision 9f5a281a2e5c0780bf4bbfbb65ff11176fdba3cb (refs/remotes/origin/master)
 > git config core.sparsecheckout # timeout=10
 > git checkout -f 9f5a281a2e5c0780bf4bbfbb65ff11176fdba3cb # timeout=10
Commit message: "chore: changed port from 8080 to 5050"
First time build. Skipping changelog.
[BuildAppJob] $ /bin/sh -xe /tmp/jenkins5486945177744948488.sh
+ bash ./sample-app.sh
mkdir: cannot create directory ‘tempdir’: File exists
mkdir: cannot create directory ‘tempdir/templates’: File exists
mkdir: cannot create directory ‘tempdir/static’: File exists
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

Sending build context to Docker daemon  6.656kB

Step 1/21 : FROM python
latest: Pulling from library/python
cdd62bf39133: Pulling fs layer
a47cff7f31e9: Pulling fs layer
a173f2aee8e9: Pulling fs layer
01272fe8adba: Pulling fs layer
ca852fa4243b: Pulling fs layer
8e0f50619958: Pulling fs layer
fc5ef6d7bb7c: Pulling fs layer
ca852fa4243b: Waiting
01272fe8adba: Waiting
fc5ef6d7bb7c: Waiting
```

```
 ---> bdb9fe7ff969
Successfully built bdb9fe7ff969
Successfully tagged sampleapp:latest
3986465cee017e53f37a6a48edb6c48d21b0bc6c268f4805de799f6545fc6c73
CONTAINER ID   IMAGE                                COMMAND                  CREATED
STATUS                  PORTS                                                 NAMES
3986465cee01   sampleapp                            "/bin/sh -c 'python …"   Less than a second ago
Up Less than a second   0.0.0.0:5050->5050/tcp, :::5050->5050/tcp             samplerunning
a0aca5013037   jenkins/jenkins:2.414.3-slim-jdk17   "/usr/bin/tini -- /u…"   31 minutes ago
Up 31 minutes           0.0.0.0:8080->8080/tcp, :::8080->8080/tcp, 50000/tcp  jenkins_server
Finished: SUCCESS
```

Además observamos que se creó el contenedor `sampleapp` con el build. Se ve en la consola y también en mi WSL:

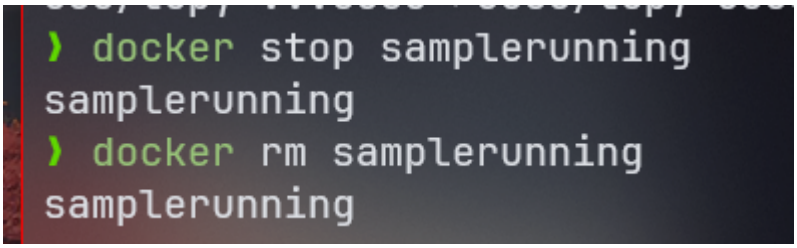


Y se puede acceder a la app:

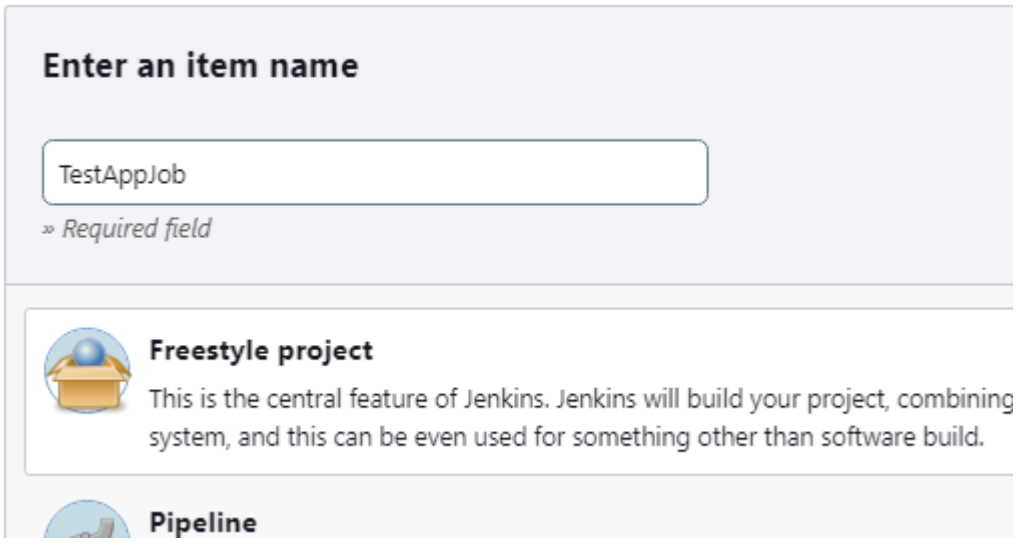


Usamos jenkins para testear nuestra app

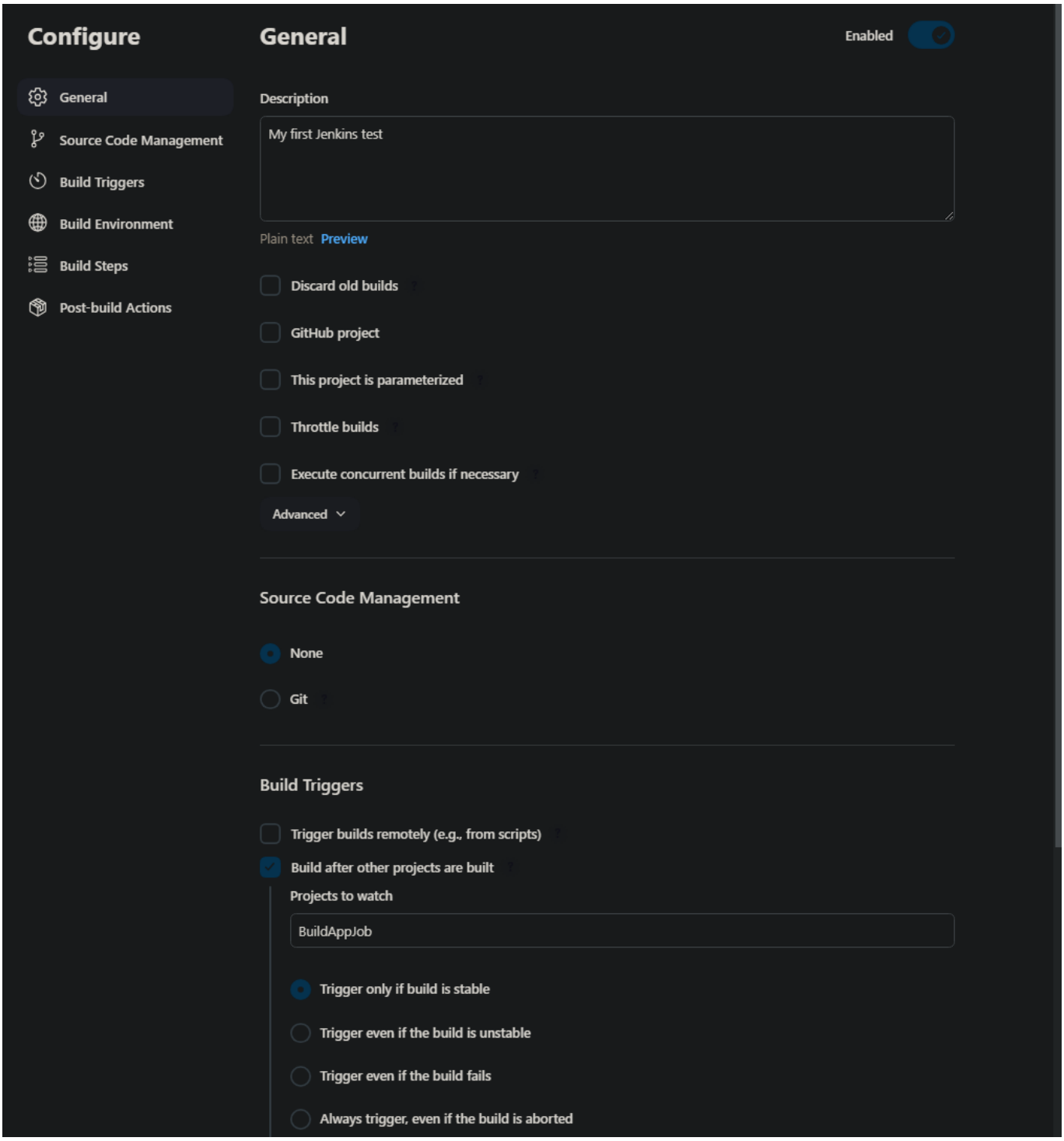
Se para y remueve el contenedor:

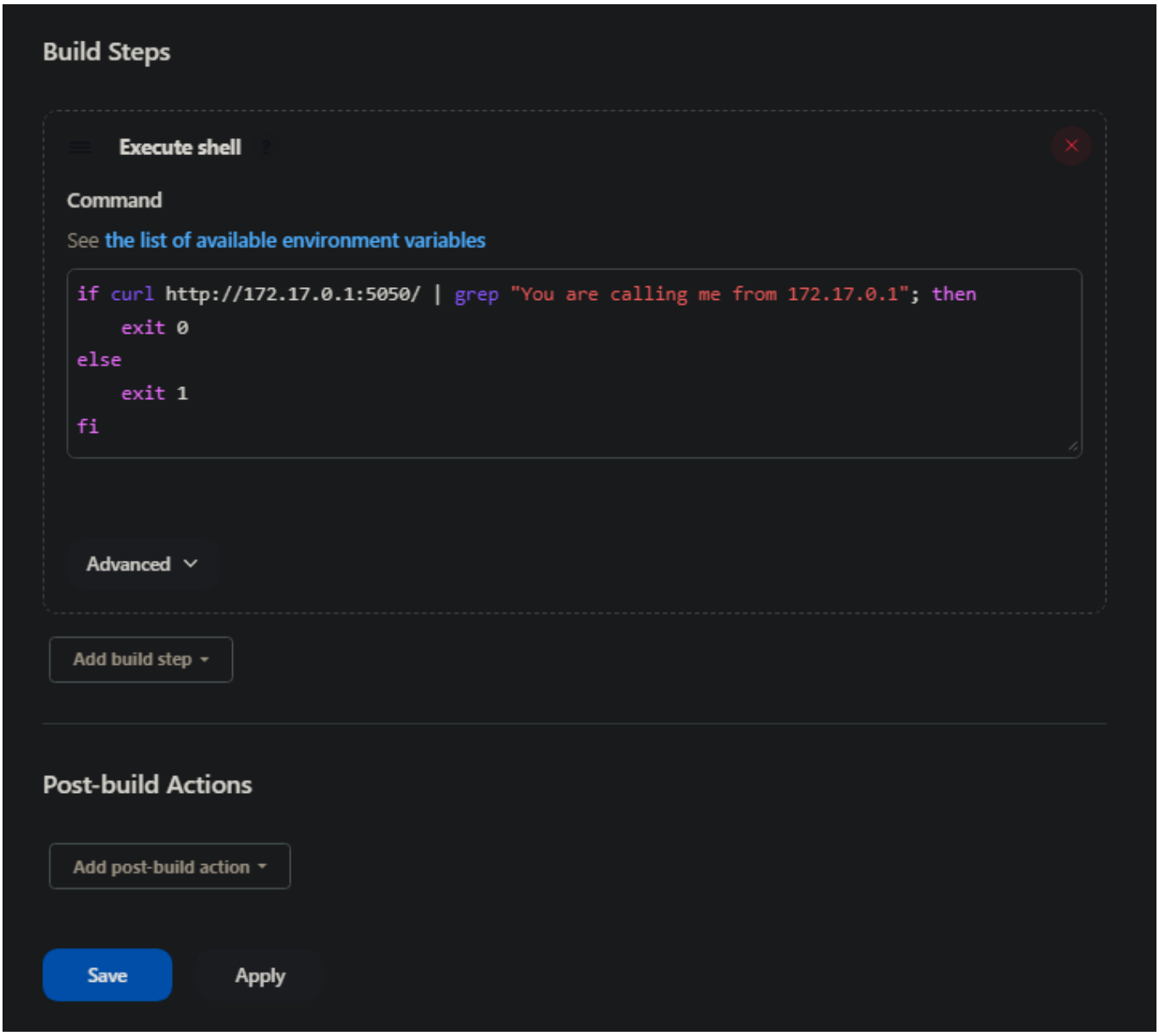


Creamos nuevo job para testing TestAppJob. Como Freestyle project.

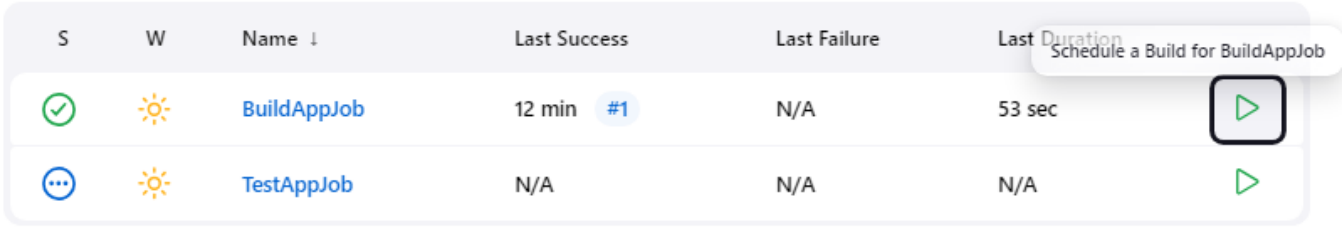


Configuramos el job:

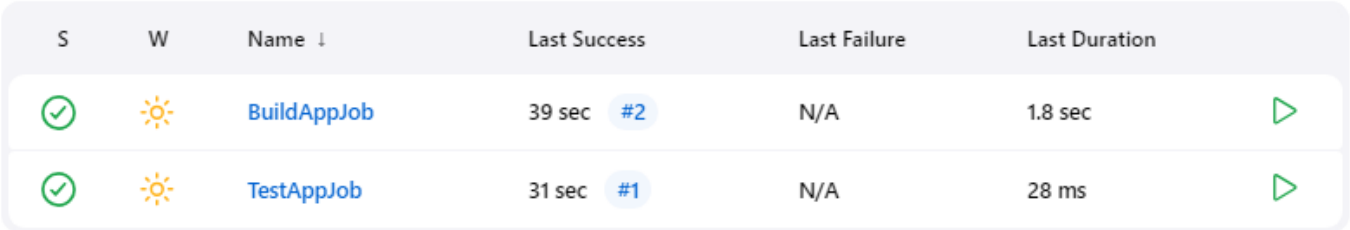

Configure
General
Enabled
General
Source Code Management
Build Triggers
Build Environment
Build Steps
Post-build Actions
Description
My first Jenkins test
Plain text Preview
Discard old builds
GitHub project
This project is parameterized
Throttle builds
Execute concurrent builds if necessary
Advanced
Source Code Management
None
Git
Build Triggers
Trigger builds remotely (e.g., from scripts)
Build after other projects are built
Projects to watch
BuildAppJob
Trigger only if build is stable
Trigger even if the build is unstable
Trigger even if the build fails
Always trigger, even if the build is aborted



Corremos el BuildAppJob:



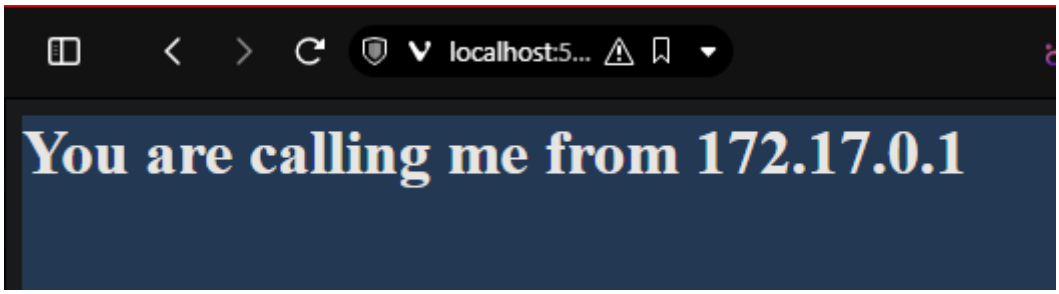
Como vemos se ejecutaron ambos jobs con éxito:



Log del testing:

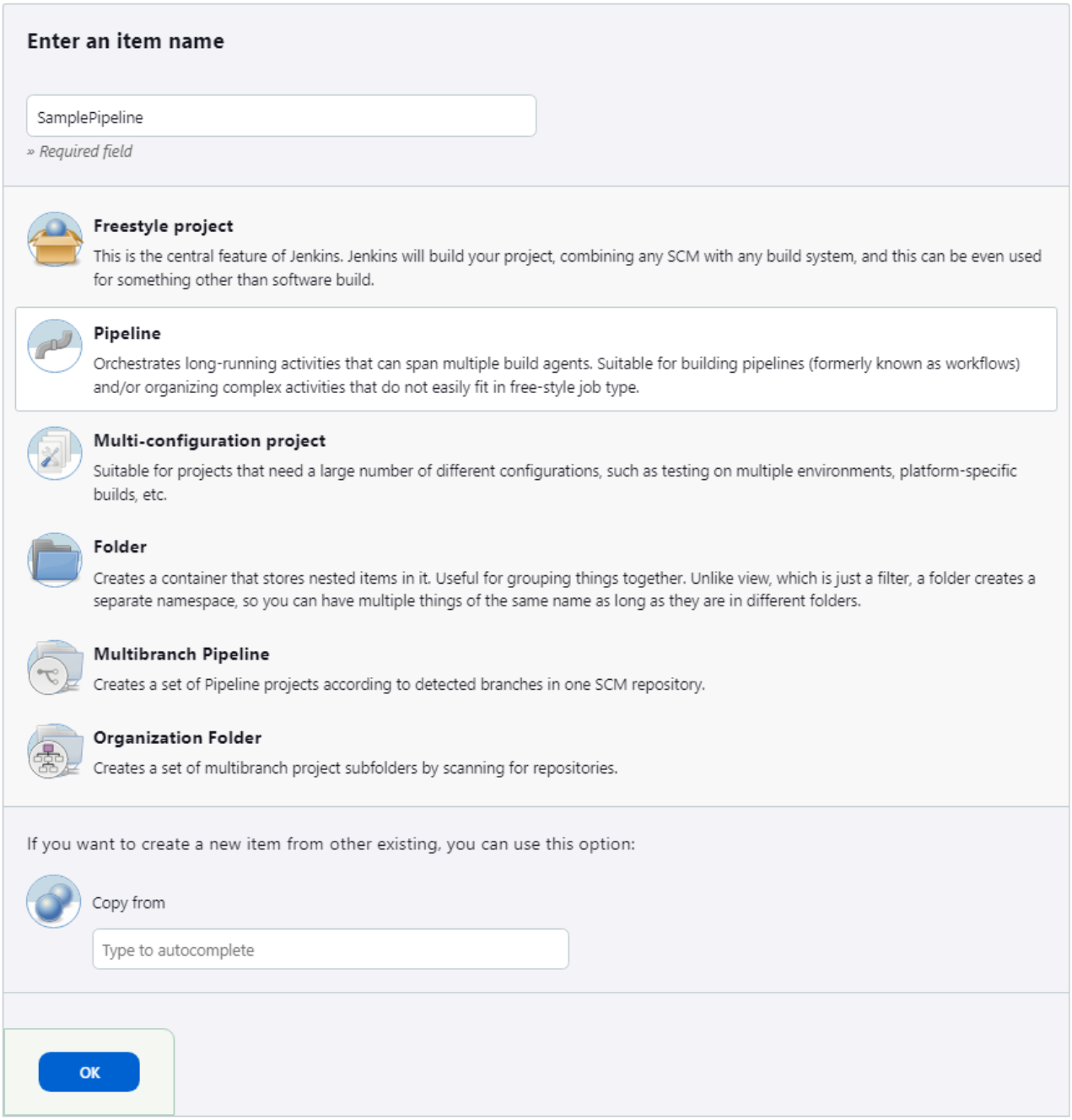
Console Output

```
Started by user admin
Running as SYSTEM
Building in workspace /var/jenkins_home/workspace/TestAppJob
[TestAppJob] $ /bin/sh -xe /tmp/jenkins1881255256384345467.sh
+ curl http://172.17.0.1:5050/
+ grep You are calling me from 172.17.0.1
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed

  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0
100   177  100   177    0     0  96721      0 --:--:-- --:--:-- --:--:--  172k
    <h1>You are calling me from 172.17.0.1</h1>
+ exit 0
Finished: SUCCESS
```

Funcionando la app!: 

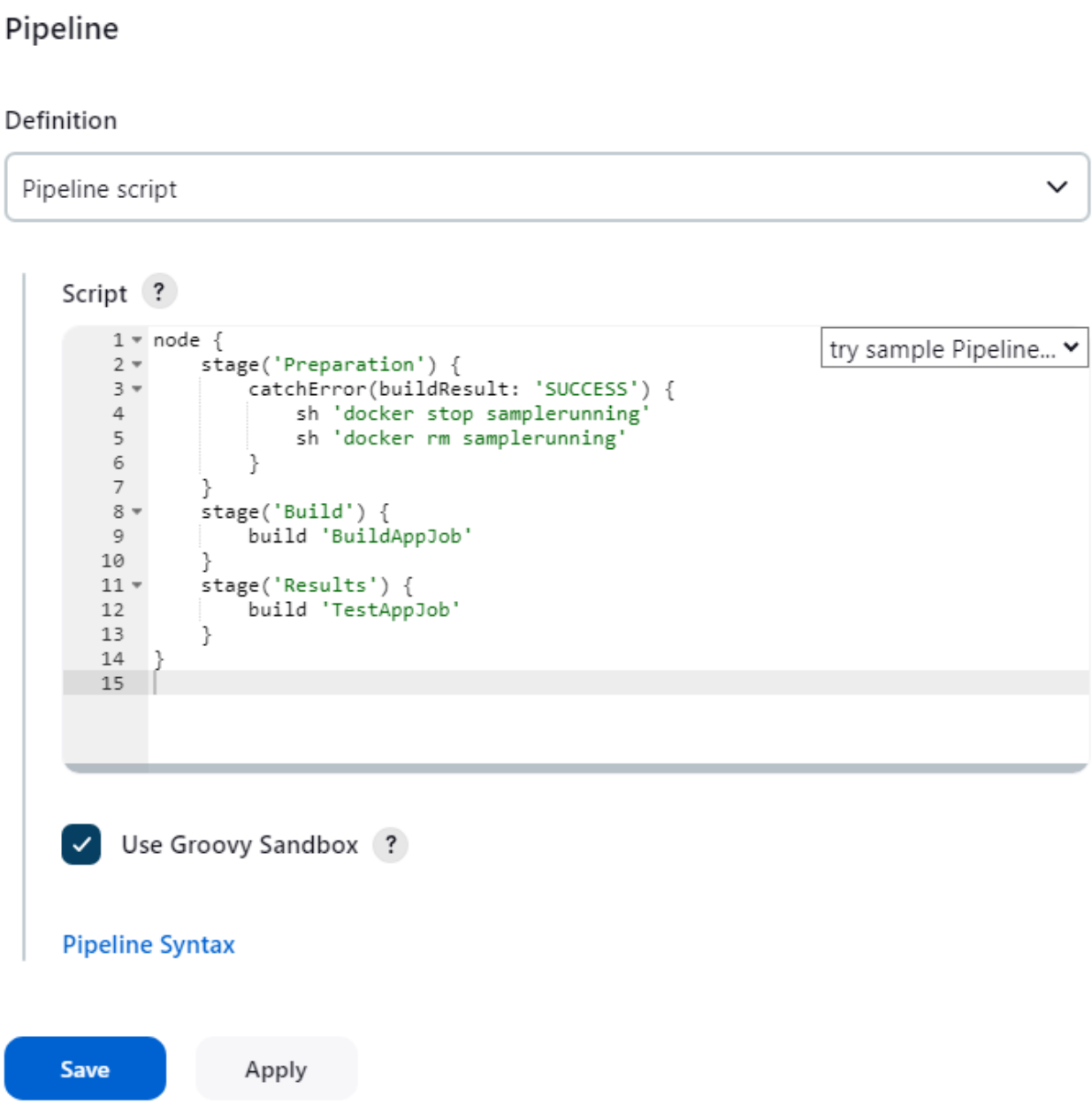
Creamos pipeline en jenkins:

Cremos el item SamplePipeline de tipo Pipeline.

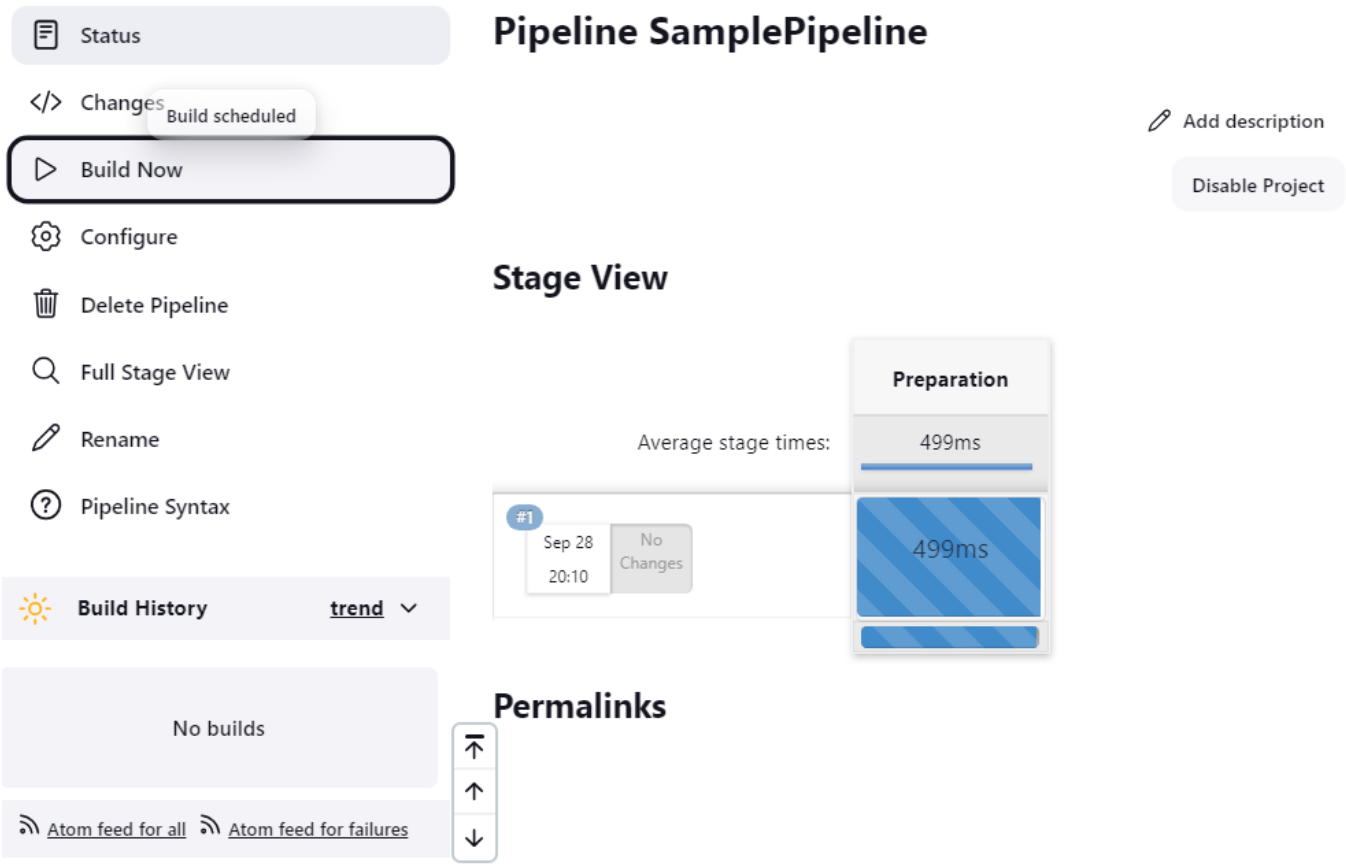


Configuramos la pipeline:

Agregamos Script:

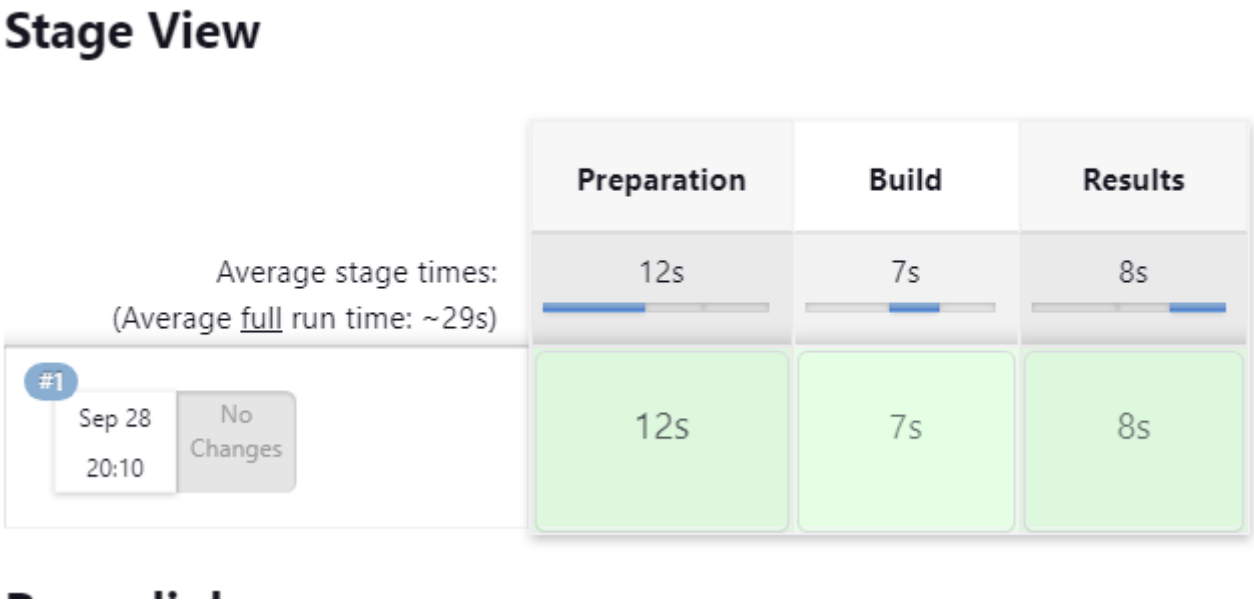


Ejecutamos el pipeline:



Resultados:

Stage View:



Logs:

```
Started by user admin
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in /var/jenkins_home/workspace/SamplePipeline
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Preparation)
[Pipeline] catchError
[Pipeline] {
[Pipeline] sh
+ docker stop samplerunning
samplerunning
[Pipeline] sh
+ docker rm samplerunning
samplerunning
[Pipeline] }
[Pipeline] // catchError
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Build)
[Pipeline] build (Building BuildAppJob)
Scheduling project: BuildAppJob
Starting building: BuildAppJob #3
Build BuildAppJob #3 completed: SUCCESS
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Results)
[Pipeline] build (Building TestAppJob)
Scheduling project: TestAppJob
Starting building: TestAppJob #4
Build TestAppJob #4 completed: SUCCESS
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

Además se comprobó que la app funcionaba.

Cuestionario

1. ¿Qué es una pipeline de Jenkins? ¿Cuáles son los tipos de pipelines de Jenkins?

Una pipeline de Jenkins es una serie automatizada de pasos para CI/CD. Los tipos principales son declarativas (estructura predefinida, sintaxis simple) y scripted (flexibles, usan código Groovy).

Las pipelines permiten definir el ciclo de vida completo de una aplicación, desde la obtención del código fuente hasta el despliegue.

- Las declarativas usan bloques predefinidos como 'pipeline', 'stage', y 'steps', facilitando la creación de flujos de trabajo estandarizados.
- Las scripted ofrecen mayor control y personalización, permitiendo lógica compleja mediante Groovy. Ambos tipos soportan control de versiones, lo que facilita la gestión y evolución de los procesos de CI/CD.

2. ¿Cómo se pueden activar (triggered)/ detener / controlar los trabajos de Jenkins mediante programación?

Los trabajos de Jenkins se pueden controlar programáticamente de varias formas:

- API REST: Permite interactuar con Jenkins mediante solicitudes HTTP.
    - Iniciar trabajos: POST /job/{nombre_trabajo}/build
    - Detener trabajos: POST /job/{nombre_trabajo}/stop
    - Obtener estado: GET /job/{nombre_trabajo}/lastBuild/api/json
- CLI de Jenkins: Ofrece comandos para control desde la línea de comandos.
    - java -jar jenkins-cli.jar -s http://localhost:8080/ build {nombre_trabajo}
    - java -jar jenkins-cli.jar -s http://localhost:8080/ stop-builds {nombre_trabajo}
- Bibliotecas de lenguajes: Wrappers que simplifican la interacción con Jenkins.
    - Python: python-jenkins
    - Java: jenkins-client-api
    - Node.js: jenkins-api

3. ¿Cómo se logra la integración continua con Jenkins?

Jenkins logra la integración continua mediante los siguientes pasos:

1. Conexión con control de versiones:
    - Se integra con sistemas como Git, SVN para detectar cambios en el código.
    - Configura webhooks o polling para iniciar automáticamente el proceso CI.
2. Compilación automática:
    - Inicia la compilación del proyecto cuando se detectan cambios.
    - Utiliza herramientas como Maven, Gradle, o npm según el tipo de proyecto.

3. Ejecución de pruebas:
    - Ejecuta conjuntos de pruebas unitarias, de integración y funcionales.
    - Genera informes de cobertura y calidad del código.
4. Análisis estático de código:
    - Integra herramientas como SonarQube para evaluar la calidad del código.
5. Notificaciones:
    - Informa a los desarrolladores sobre el estado de las compilaciones y pruebas.
    - Utiliza correos electrónicos, Slack, o plugins de notificación.
6. Despliegue automático:
    - Despliega la aplicación en entornos de prueba o producción si todas las etapas anteriores son exitosas.

Este proceso permite detectar y corregir problemas rápidamente, mejorando la calidad del software y acelerando el desarrollo.

4. Análisis del texto:

Lo que entendí del texto es que la aplicación de CI/CD a las redes es un proceso complejo pero necesario para mejorar la gestión y confiabilidad de las infraestructuras de red modernas. El autor explica que para implementar CI/CD en redes, primero necesitamos crear un modelo preciso de la infraestructura existente, lo cual no es tarea fácil debido a la complejidad de las redes actuales y el uso de tecnologías de virtualización como VRF y EVPN.

Me pareció interesante el concepto de "gemelo digital de red" que se menciona. Entiendo que es una réplica virtual de la red real que nos permite probar cambios de configuración antes de aplicarlos en producción. Esto me recuerda a cómo los desarrolladores de software usan entornos de prueba, pero aplicado a redes.

El texto enfatiza que el proceso de CI/CD para redes debe ser similar al usado en desarrollo de software: desarrollar, probar en un entorno controlado, y si todo está bien, implementar en producción. Sin embargo, reconoce que muchas organizaciones querrán verificar manualmente los cambios antes de aplicarlos, lo cual me parece prudente.

Lo que más me llamó la atención fue el enfoque gradual que sugiere para adoptar CI/CD en redes. Propone comenzar con tareas simples y de bajo impacto, e ir escalando poco a poco. Esto me parece muy sensato, ya que permite a los equipos adaptarse y aprender del proceso sin riesgos mayores.

En resumen, entiendo que aunque implementar CI/CD en redes requiere un cambio significativo en la forma de trabajar y una inversión inicial en herramientas y procesos, los beneficios a largo plazo en términos de reducción de errores y mayor eficiencia hacen que valga la pena el esfuerzo. El objetivo final es llevar las mejores prácticas del desarrollo de software al mundo de las redes, lo cual tiene sentido en un entorno cada vez más dependiente de la tecnología y la automatización.

5. Explica qué es virtual routing and forwarding (VRF) y Ethernet VPN (EVPN).

Ambas son tecnologías de virtualización de red que permiten la separación lógica de recursos de red:

VRF (Virtual Routing and Forwarding):

- Es una tecnología que permite múltiples instancias de una tabla de enrutamiento coexistir en el mismo router simultáneamente.
- Cada instancia de VRF tiene su propia tabla de enrutamiento independiente, proporcionando aislamiento de tráfico y permitiendo el uso de espacios de direcciones superpuestos.
- Principales características:
- Segmentación de red: Separa lógicamente diferentes redes en un mismo dispositivo físico.
- Reutilización de direcciones IP: Permite usar los mismos rangos de IP en diferentes VRFs sin conflictos.
- Mejora la seguridad: Aísla el tráfico entre diferentes VRFs.

EVPN (Ethernet VPN):

- Es una solución de capa 2 y capa 3 para redes de centros de datos y campus que utiliza BGP para distribuir información de direcciones MAC e IP.
- Proporciona una forma eficiente de interconectar sitios a través de una red IP/MPLS.
- Características principales:
- Soporte multi-tenancy: Permite a múltiples clientes compartir la misma infraestructura física.
- Control plane basado en BGP: Utiliza BGP para el intercambio de información de enrutamiento y reenvío.
- Reducción de inundación (flooding): Mejora la eficiencia al limitar la propagación innecesaria de tráfico broadcast y multicast.
- Movilidad de MAC: Facilita la movilidad de máquinas virtuales entre diferentes sitios.

Ambas tecnologías son fundamentales en la creación de redes virtuales y en la implementación de soluciones de nube y centros de d atos modernos, proporcionando flexibilidad, escalabilidad y seguridad mejoradas.