

# ***Network Documentation & Netdot***

# Documentation

Have you ever asked, "*How do you keep track of it all?*"



Document,  
Document,  
Document!

# Documentation

## **Basics, such as documenting your switches...**

- What is each port connected to?
- Can be simple text file with one line for every port in a switch:
  - health-switch1, port 1, Room 29 – Director's office
  - health-switch1, port 2, Room 43 – Receptionist
  - health-switch1, port 3, Room 100 – Classroom
  - health-switch1, port 4, Room 105 – Professors Office
  - .....
  - health-switch1, port 25, uplink to health-backbone
- This information might be available to your network staff, help desk staff, via a wiki, software interface, etc.
- Remember to label your ports!

# Documentation

Maybe this process should be automatic. Tools to help automate network documentation are something to consider.

- You can write local scripts (programs) to do this.
- Consider among several automated documentation systems for networks.
- You'll probably end up using and doing both.



# Documentation: Labelling

Nice... 😊



# Problems With Documentation

In most cases:

- Lack of clear procedures and methods
- Dispersion
- Lack of structure
- Lack of correlation
- Lack of tools... or, too many tools
- Lack of time and human resources

# What is Source of Truth?



*“The **Source of Truth** can be defined as a conceptual practice that help an organization to control and manage the necessary data and assets from a specific place in an efficient way.*

*Some people would like to call it **System of Record**.”*

## Let's have an example

A scenario of an enterprise company, where –

- It has several branch offices.
- Assets information is kept by the IT team; for non-IT domain assets as well.
- Non-IT domain information is required by different teams.
  - Like - quantity of online UPS, and its connectivity.
  - Concerned team is Power-Team; but required by NOC, IT and Procurement as well.

# What is Source of Truth?



## Questions to think about?

- Should they store information separately?
  - *assuming procurement and power team maintain it individually.*
- Or manage it from a single place?
  - *more of a library, where books are arranged categorically based on the genre!*

## Focal Point!

- This is where ***Single Source of Truth*** takes place, which ensures:
  - Reuse of content or data
  - Eliminate information duplicity

“The **Single Source of Truth** is the authorized component of *Network Documentation* service where necessary information is categorized and managed to help automate network infrastructure.”

“**Network Documentation is a process-oriented practice, to maintain the records of network components.**”



# Network Documentation in Operational Process



## Difference Between Traditional and Automated Approach

Traditional Approach	SoT for Automation
Hosts/devices are configured in each NoC tools separately. – probability of missing a device to configure.	Host/device related information are coming only from SoT. – You get to know the missing point.
Data being imported from one tool to another depending information availability.	All tools are being populated from SoT by push/pull method.
<b>Example</b> CPU utilization and NIC bandwidth of a router are monitored by two monitoring systems. e.g - LibreNMS and Nagios.	<b>Example</b> With SoT, it can be defined based on the policy that Nagios will monitor the <i>uptime</i> , and LibreNMS will monitoring utilization of CPU and Interface.

\* SoT – Source of Truth

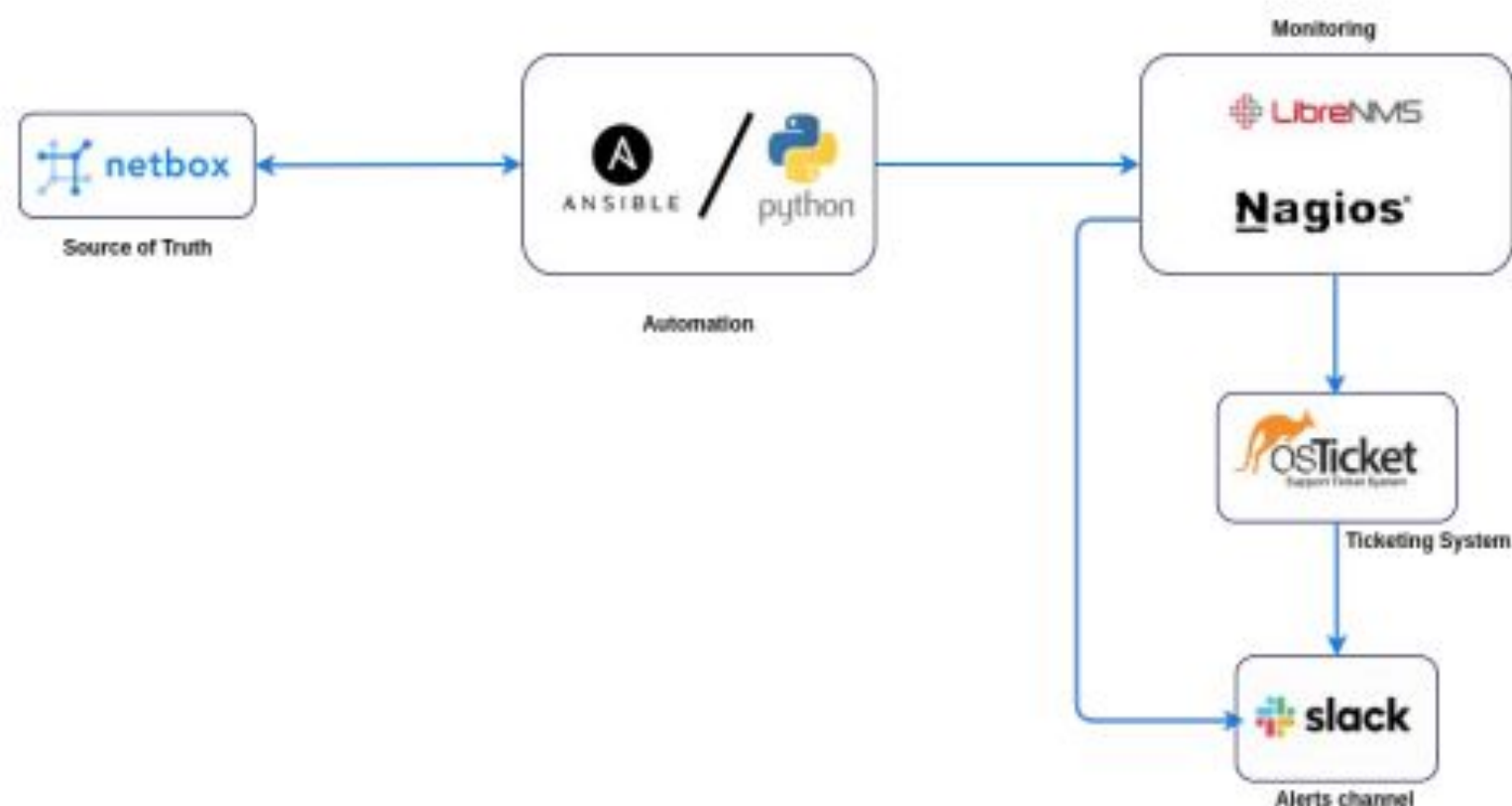
\* CPU - Central Processing Unit

\* NIC - Network Interface Card

# Network Documentation in Operational Process



## Source of Truth in Automation



### To describe the scenario:

- Netadmin added a Cisco router to a distribution point.
- Once the deployment is done, an entry was made to the SoT
- Using REST-API ansible will pull the new device information
- And then, ansible will push the device info in predefined format to the Monitoring system
- NMS will monitor device performance and utilization based on the NMS policy.
- If anything goes wrong, as alert triggers to a Ticketing system and Alert channels

# Network Documentation in Operational Process

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## Benefits of maintaining Network Documentation!

- Can have a clear understanding, how the network is being operated!
- Get to know, how the data center is being managed!
- One can have a historical overview of what has been done a few months ago.
- In case of any senior or teammate's absence, other team members can troubleshoot the issue as required.



# Network Documentation – an example for operations?



A multinational company wants to deploy a media service for its employee.

- IT admin has placed a requisition to purchase 2 server hardware, 1 NAS (*Network-attached storage*).
- The **IT Manager** got the request and followed a predefined **checklist** to validate.

## Checklist?

Adequate rack space to host new server hardware.

Free socket ports of power strip.

Network cable capacity specifications. like - 1.00 GbE or 10.00 GbE?

Network cable types. Like - ethernet or fiber optics?

Availability of IP address.

Power consumption availability from online UPS.

Length of network cable.

*“What could happen, to evaluate the requisition paper, if there is no Network Documentation in place?”*



# Network Documentation Policy

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**A documentation policy has to be defined –**

- What are the responsibilities of each team and teammates? *Who will take care of which part?*
- Does the network topology diagram have up-to-date details? *Like a server's connectivity as a whole.*
- Process to check task integrity! *Did the network admin followed every step to upgrade a router OS?*
- What should be the methodology for the naming pattern, to identify devices, cables, connectivity, etc?

# Network Documentation Policy – example

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**Everything should be labeled in a comprehensive manner.**

- Devices – servers, routers, switches, servers, KVM, power strips, etc.
- Cabling of power cord and network connectivity.
- Racks; which data center or region it belongs.

# Network Documentation Policy – example



Labeling format	Device Naming Format
<p><b>Device Tag:</b> <b>Format:</b> Rack_Number/Device_Number <b>Example:</b> R-06/SRV05</p>	<ul style="list-style-type: none"><li>• Router -&gt; RTR</li><li>• Switch -&gt; SWC</li><li>• Server -&gt; SRV</li><li>• Appliance -&gt; APL</li><li>• Modem -&gt; MDM</li><li>• SAN Storage -&gt; SAN</li><li>• NAS Storage -&gt; NAS</li><li>• WL Access Point -&gt; AP</li><li>• Temperature Meter -&gt; TMP</li><li>• KVM -&gt; KVM</li><li>• Cable Manager -&gt; CM</li><li>• IP Phone -&gt; IPP</li></ul>
<p><b>Cable Tag :</b> <b>Format:</b> Source_Device_ID/Destination_Device_ID-Port_Number/Name <b>Example:</b> R-01/RTR02/R-13/SWC03-1/1/1</p>	

# NetBox – The Network Documentation Application

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## What is NetBox?

- NetBox is an Open-Source Network Documentation application.
- Written in python with Django web-framework
- Provide integration with API, webhooks, plugins, custom python scripts, etc.
- Developed by **Jeremy Stretch** of *Digital Ocean* at late 2015.
- Serve at Django web framework with PostgreSQL.



# NetBox – The Network Documentation Application

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## Features of NetBox

- **IP address management (IPAM)** - IP networks and addresses, AS numbers, VLANs
- **Data Center Infrastructure Management**
  - **Physical Infrastructure**
    - **Racks** – Arranged by specific sites
    - **Devices** - Types of devices and where they are installed
    - **Connections** – KVM console, network and power connections among devices.
  - **Virtualization** – Specifications of virtual machines.

# NetBox – The Network Documentation Application

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## Why NetBox? *Comparison or Facts!*

An ISP Using a ***spreadsheet*** for IP address management. Let's see the scenario of issues they are having.

- IP address calculation is manual; *the chance of error is high*
- No correlation between the IPs with Network/Server components; *like which IP is assigned to which interface of the network components.*
- NO way of network automation.

***\*\* Spreadsheets are easy to use, and Ideal for a small group of people or organizations.***

# NetBox – The Network Documentation Application

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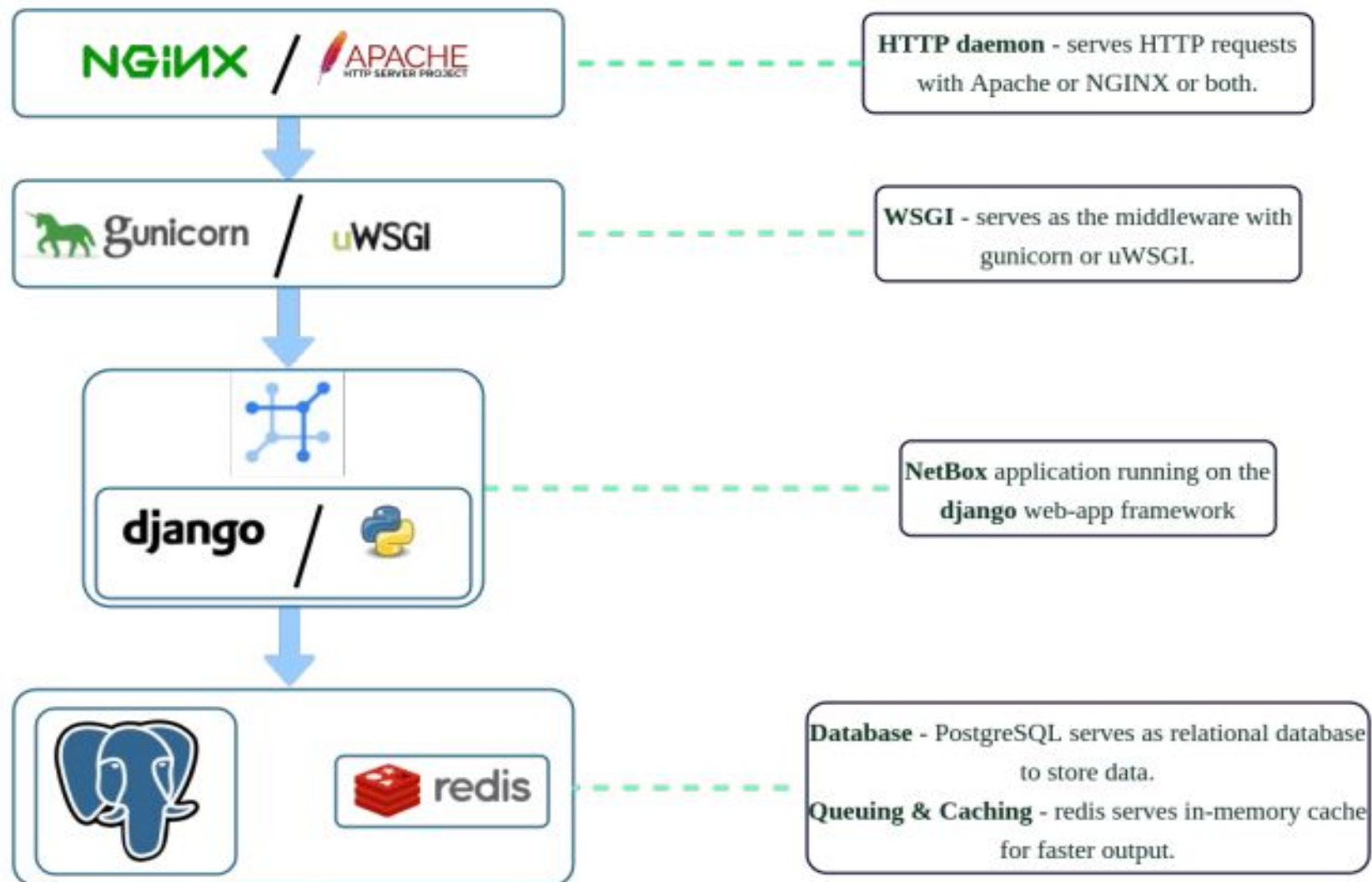
Few things that NetBox **doesn't do** –

- It does not do network monitoring.
- It doesn't have the mechanism to serve as a DNS server.
- Doesn't have AAA mechanism to support RADIUS server. (*AAA = Authentication, Authorization and Accounting*)
- Configuration management
- Facilities management

# NetBox – The Network Documentation Application



## Application Architecture





# NetBox – The Network Documentation Application

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## Application Integration

- JSON format data is being transmitted through **REST API**.
- In response to an event, **Webhook** is used to send the HTTP request.
- Custom scripts are used with python from the **Netbox UI/API**.

# NetBox – The Network Documentation Application



Organization	
Sites	
Geographic locations	
Tenants	
Customers or departments	

DCIM	
Racks	
Equipment racks, optionally organized by group	
Device Types	
Physical hardware models by manufacturer	
Devices	
Rack-mounted network equipment, servers, and other devices	
Connections	
Cables	
Interfaces	
Console	
Power	

IPAM	
VRFs	
Virtual routing and forwarding tables	
Aggregates	
Top-level IP allocations	
Prefixes	
IPv4 and IPv6 network assignments	
IP Addresses	
Individual IPv4 and IPv6 addresses	
VLANs	
Layer two domains, identified by VLAN ID	

Circuits	
Providers	
Organizations which provide circuit connectivity	
Circuits	
Communication links for Internet transit, peering, and other services	

Power	
Power Feeds	
Electrical circuits delivering power from panels	
Power Panels	
Electrical panels receiving utility power	

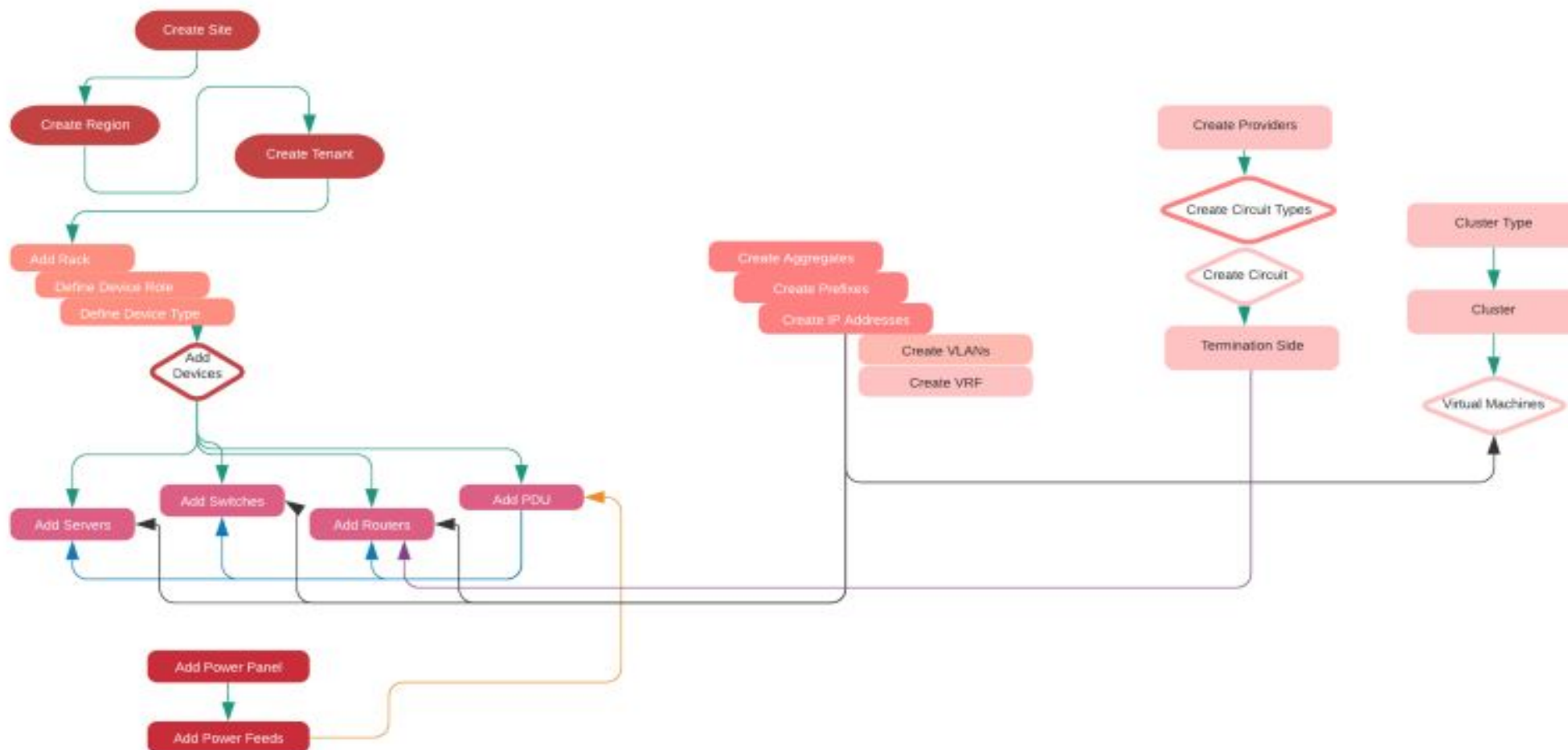
Virtualization	
Clusters	
Clusters of physical hosts in which VMs reside	
Virtual Machines	
Virtual compute instances running inside clusters	

## Major Modules of NetBox

# NetBox – The Network Documentation Application



## NetBox Workflow



# **NetBox – Lets Play with the DCIM Module**



# NetBox – DCIM Module



Let's say an Enterprise company is going to document their Data Center. What should they be doing?

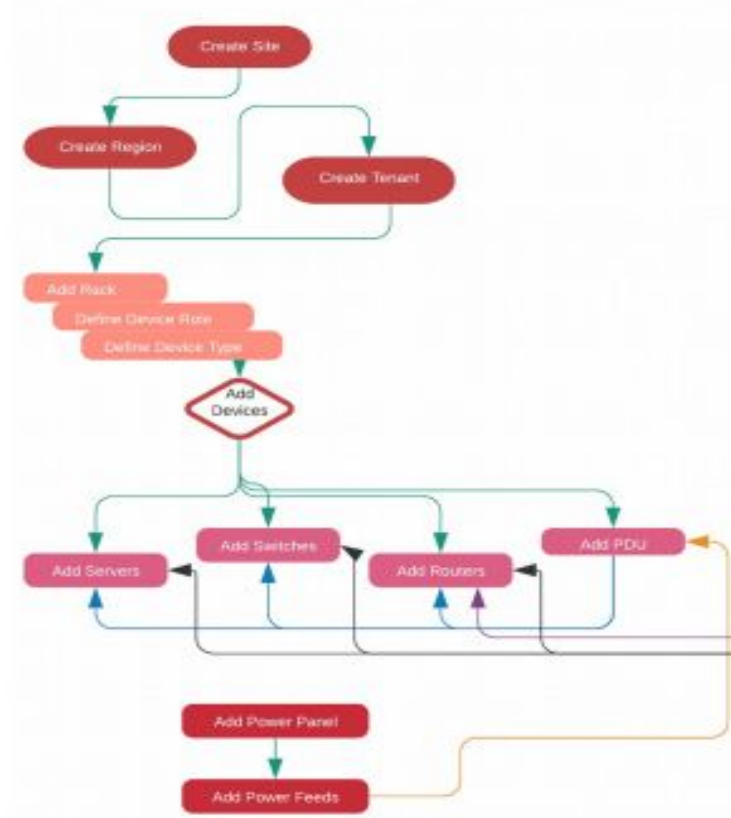
- Creating a list of what they have; *from passive to active network components.*
- Label all the assets; *so that any person can correlate the soft labeling info to the actual one.*
- And get a simple logical view of the RACK as it is physically.

# NetBox – DCIM Module



We will see how the below list works with DCIM module according to the flow diagram.

- Organization, to define the physical instance
- DCIM, to define all the components
- Power, to get the actual view of NetBox.



# Explore the NetBox service - DCIM

We will practice the following steps to explore NetBox application.

- Create the first site
- Create the first region
- Connect the region with the site
- Create the tenant to define the department
- Connect the tenant with the site
- Add new Rack
- Define device role
- Define device type
- Add devices
- Add power-panels
- Add power-feeds
- Add power distribution unit (PDU)
- Add a few components to the server

## Create the first site:

Go to the homepage and click **Sites** under the **Organization** tab.

New page will come up, click on the **+Add** button and fill in the form.

### Add a new site

Site

Name

First APNIC Lab

Full name of the site

Slug

first-apnic-lab

URL-friendly unique shorthand

Status

Active

Region

Facility

Facility

Data center provider and facility (e.g. Equinix NY7)

ASN

ASN

BGP autonomous system number

Time zone

Australia/Brisbane

Local time zone

Description

APNIC Data Center

Short description (will appear in sites list)



### Create the first region:

Next, we have to create the region to complete the first part of the `Organization` tab.

To do that, again go to the homepage and click `Regions` under the `Organization` tab.

New page will comeup, click on the `+Add` button and fill in the form.

### Add a new region

Region

Parent

Name

APNIC-HQ

Slug

apnic-hq

URL-friendly unique shorthand

Description

Description

Create

Create and Add Another

Cancel

# Connect the region with the site:

Now we need connect Regions to Sites .

Go to Sites from the Organization tab, Select the First APNIC Lab and click on Edit Selected .

A new window come up. Next, right side of the window there are few options, select APNIC-HQ from the drop down menu at Region field, and click on Apply

Name	Status	Facility	Region	Tenant	ASN	Description
First APNIC Lab	Active	—	—	—	—	APNIC Data Center

**Attributes**  

Status

Region

Tenant

ASN

Description

Time zone

Add tags

Remove tags

APNIC-HQ

Set null

Set null

Set null

Set null

Apply

Now it should look like this.

## Sites

<input type="checkbox"/>	Name	Status	Facility	Region	Tenant	ASN	Description
<input type="checkbox"/>	First APNIC Lab	Active	—	APNIC-HQ	—	—	APNIC Data Center

## Create a tenant:

Lets create a tenant to define the department.

Go to the home page, and nevigat **Tenants** option from the **Organization** block.

Click it, new window will popup, click on the **+Add** button to add a new one. Fillup the gap and click on **Create** button.

### Add a new tenant



Tenant	
Name	<input type="text" value="DC Management"/>
Slug	<input type="text" value="dc-management"/>
	URL-friendly unique shorthand
Group	<input type="text" value=""/>
Description	<input type="text" value="Data Center Management Team"/>

# Connect the tenant with the site:

- Go to Sites from the Organization tab, Select the First APNIC Lab and click on Edit Selected .
- Next, right side of the window there are few options, select DC Management from the drop down menu at Tenant field, and click on Apply

Name	Status	Facility	Region	Tenant	ASN	Description
First APNIC Lab	Active	—	APNIC-HQ	—	—	APNIC Data Center

Attributes

Status

Region

☐ Set null

Tenant

DC Management

☐ Set null

ASN

Description

☐ Set null

Time zone

☐ Set null

Add tags

Remove tags

Apply

Now it should it look like this.

## Sites

<input type="checkbox"/> Name	Status	Facility	Region	Tenant	ASN	Description
<input type="checkbox"/> First APNIC Lab	Active	—	APNIC-HQ	DC Management	—	APNIC Data Center



## Add new RACK:

To add a new rack, go to the home page, and nevigat Racks option from the DCIM block.

Click it, new window will popup, click on the +Add button to add a new one. Fillup the gap, use First APNIC Lab as site, use APNIC-HQ for region, DC Management for tenant, from the drop down option respectively; use the name of the rack as APNICHQ/Rack01 and click on Create button.

### Add a new rack

Rack

Region

APNIC-HQ

x

▾

Site

First APNIC Lab

x

▾

Name

APNICHQ/Rack01

Organizational rack name

Facility ID

Facility ID

The unique rack ID assigned by the facility

Group

-----

▾

Status

Active

x

▾

Role

-----

▾

Serial number

R2020233333

Asset tag

AHQ/R01

A unique tag used to identify this rack

## Tenancy

Tenant group

-----



Tenant

DC Management



## Dimensions

Type

4-post cabinet



Width

23 inches



Rail-to-rail width

Height (U)

42

Height in rack units

Outer dimensions

Outer width

Outer depth

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☐ Descending units

Units are numbered top-to-bottom

The output will be like this.

## Rack APNICHQ/Rack01

Created Dec. 23, 2020 · Updated 3 minutes ago

Rack [Change Log](#)

[Show Images](#)

Rack	
Site	APNIC-HQ / First APNIC Lab
Group	None
Facility ID	—
Tenant	DC Management
Status	Active
Role	None
Serial Number	R2020233333
Asset Tag	AHQYR01
Devices	0
Space Utilization	0%
Power Utilization	0%

Dimensions	
Type	4-post cabinet
Width	19 inches

← Previous Rack

→ Next Rack

+ Clone

✎ Edit

🗑 Delete

Front



Rear



# Define device role:

- Before adding new device, we have to create few necessary definition for devices.
- To create device role, navigate Device Roles option from the drop down menu Devices .
- Click it, new window will popup, click on the +Add button to add a new one. Add router, server, etc with assigning the color code.
- Note: make sure you uncheck the option VM Role
- it should look like this.

## Device Roles



<input type="checkbox"/> Name	Devices	VMs	Color	VM Role	Description
<input type="checkbox"/> Core Router	0	0		✗	—
<input type="checkbox"/> Core Switch	0	0		✗	—
<input type="checkbox"/> Distribution Router	0	0		✗	—
<input type="checkbox"/> Distribution Switch	0	0		✗	—
<input type="checkbox"/> NAS	0	0		✗	—
<input type="checkbox"/> Power Strip	0	0		✗	—
<input type="checkbox"/> Server	0	0		✗	—

Delete Selected



### Define device type:

Need to create the Manufacturers first, before creating device types.

From the Devices drop down menu, select Manufacturers and then click +Add from the new window.

Create Cisco and Dell, by fill in the gap, and it will look like below.

#### Add a new manufacturer

Manufacturer

Name

Slug

C

Description

URL-friendly unique shorthand

Create

Create and Add Another

Cancel

### Manufacturers

Configure

+ Add

Import

Export

<input type="checkbox"/>	Name	Device Types	Inventory Items	Platforms	Description	Slug	
<input type="checkbox"/>	Cisco	0	0	0	—	cisco	<div><div></div><div></div><div></div></div>
<input type="checkbox"/>	Dell	0	0	0	—	dell	<div><div></div><div></div><div></div></div>

0 Selected

50 per page

Showing 1-2 of 2

Next, from the Devices drop down menu, select Device Types and then click +Add from the new window.

Fill the gap with sample specification of Dell. Assuming the server is Dell PowerEdge 420, which is 2U rack.

**Note:** As this is 2U rack server, it will cover from Front to Rear, and that is why option Full Depth should be checked. But for the Cisco switch, Full Depth option should be unchecked.

## Add a new device type

Device Type

Manufacturer	<input type="text" value="Dell"/>
Model	<input type="text" value="PowerEdge 420"/>
Slug	<input type="text" value="poweredge-420"/> <input type="button" value="C"/>
	URL-friendly unique shorthand
Part number	<input type="text" value="032454020022"/>
	Discrete part number (optional)
Height (U)	<input type="text" value="2"/>
	<input checked="" type="checkbox"/> Is full depth Device consumes both front and rear rack faces
Parent/child status	<input type="text" value="Parent"/>
	Parent devices house child devices in device bays. Leave blank if this device type is neither a parent nor a child.

## Add a new device type

Device Type

Manufacturer	<input type="text" value="Cisco"/>
Model	<input type="text" value="Nexus 3550"/>
Slug	<input type="text" value="nexus-3550"/> <input type="button" value="C"/>
	URL-friendly unique shorthand
Part number	<input type="text" value="C129485677650"/>
	Discrete part number (optional)
Height (U)	<input type="text" value="1"/>
	<input type="checkbox"/> Is full depth Device consumes both front and rear rack faces
Parent/child status	<input type="text" value="Parent"/>
	Parent devices house child devices in device bays. Leave blank if this device type is neither a parent nor a child.

# Add devices:

- Finally, we are adding devices now.
- Select Devices option from the drop down menu Devices .
- New window will popup, click on the +Add button to add a new one. Add switch and server, and select all the option from the drop down menu accordingly, keep in mind to check, Hardware , Location Tenancy

## Add a new device



### Device

Name

SRV02

Device role

Server



### Hardware

Manufacturer

Dell



Device type

PowerEdge 420



Serial number

D1234567788

Chassis serial number

Asset tag

SRV02

A unique tag used to identify this device

### Location

Region

APAC-HQ



Site

First APAC Lab



Rack group

\_\_\_\_\_



Rack

APAC-HQ/Rack01



Rack face

Front



Position

U40



The lowest-numbered unit occupied by the device

### Management

Status

Active



Platform

\_\_\_\_\_



Primary IPv4

\_\_\_\_\_



Primary IPv6

\_\_\_\_\_





### Add power-panels:

Add two different Power Panels to ensure redundant power supply from two separate main power grid. Its the main power source.

e.g: APNIC-DC-Power and APNIC-DC-Power-Sec.

### Add a new power panel

Power Panel

Region

APNIC-HQ

Site

First APNIC Lab

Rack group

Name

APNIC-DC-Power

Tags

Create







Create and Add Another

Cancel





# Add power-feeds:

- Every rack should have two different power feeds from two separate power panels, assuming two separate online UPS in place.  
e.g: APNICDC/UPS-A/R01 and APNICDC/UPS-B/R01; for second one, change the Power-Panel to APNIC-DC-Power-Sec and assign name as APNICDC/UPS-B/R01 .

## Add a new power feed

Power Panel	
Region	APNIC-HQ  
Site	First APNIC Lab  
Power panel	APNIC-DC-Power  

Power Feed	
Rack	NMM-Lab-Devices  
Name	APNICDC/UPS-A/R01
Status	Active  

# Add PDU:

- PDU = Power distribution unit
- Before creating a new PDU device, create Manufacturer as XYZ , device role Power Strip , and device type PDU01 , then Go to the Devices and click on +add .
- Give the PDU a name Rack01/PDU01 , Asset Tag as R01/PDU01 , and carefully choose all the options accordingly.

### Device

Name

Rack01/PDU01

Device role

Power Strip

X →

### Hardware

Manufacturer

XYZ

X →

Device type

PDU01

X →

Serial number

Serial number

Chassis serial number

Asset tag

R01/PDU01

A unique tag used to identify this device

### Location

Region

APNIC-HQ

X →

Site

First APNIC Lab

X →

Rack group

—

→

Rack

APNICHQ/Rack01

X →

Rack face

Front

✓

Position

U35

X →

The lowest-numbered unit occupied by the device

Next, create power ports as the power inlets and power outlets as power outlet, of the PDU, from the Add New Components option.

Power port	
Device	Rack01/PDU01
Name	<input type="text" value="PDU/P01"/>
Label	<input type="text" value="R01/PDU01/P01"/> <small>Physical label</small>
Type	<input type="text" value="NEMA 1-15P"/> <small>Physical port type</small>
Maximum draw	<input type="text" value="1"/> <small>Maximum power draw (watts)</small>
Allocated draw	<input type="text" value="Allocated draw"/> <small>Allocated power draw (watts)</small>
Description	<input type="text" value="Power Inlet"/>
Tags	<input type="text" value=""/>



## Power Outlet

Device Rack01/PDU01

Name Plug[1-8]

Alphanumeric ranges are supported for bulk creation. Mixed cases and types within a single range are not supported. Examples:

- [gc,xe]-0/0/[0-9]
- c[0-3][a-d,f]

Label Plug[1-8]

Alphanumeric ranges are supported. (Must match the number of names being created.)

Type NEMA 1-15R

Power port PDU/P01 (R01/PDU01/P01)

Feed leg A

Description PDU Outlet

Tags






































Create

Create and Add More

Cancel

The power outlet should look like this.

Device Power Ports 1 Power Outlets 8 Status LLDP Neighbors Configuration Config Context Change Log

Power Outlets									Configure
<input type="checkbox"/>	Name	Label	Type	Power port	Feed leg	Description	Cable	Connection	
<input type="checkbox"/>	 Plug1	Plug1	NEMA 1-15R	<a href="#">PDU/P01 (R01/PDU01/P01)</a>	A	—	—	—	  
<input type="checkbox"/>	 Plug2	Plug2	NEMA 1-15R	<a href="#">PDU/P01 (R01/PDU01/P01)</a>	A	—	—	—	  
<input type="checkbox"/>	 Plug3	Plug3	NEMA 1-15R	<a href="#">PDU/P01 (R01/PDU01/P01)</a>	A	—	—	—	  
<input type="checkbox"/>	 Plug4	Plug4	NEMA 1-15R	<a href="#">PDU/P01 (R01/PDU01/P01)</a>	A	—	—	—	  
<input type="checkbox"/>	 Plug5	Plug5	NEMA 1-15R	<a href="#">PDU/P01 (R01/PDU01/P01)</a>	A	—	—	—	  
<input type="checkbox"/>	 Plug6	Plug6	NEMA 1-15R	<a href="#">PDU/P01 (R01/PDU01/P01)</a>	A	—	—	—	  
<input type="checkbox"/>	 Plug7	Plug7	NEMA 1-15R	<a href="#">PDU/P01 (R01/PDU01/P01)</a>	A	—	—	—	  
<input type="checkbox"/>	 Plug8	Plug8	NEMA 1-15R	<a href="#">PDU/P01 (R01/PDU01/P01)</a>	A	—	—	—	  
 Rename  Edit  Disconnect  Delete									 Add power outlets


Now create another PDU for the rack01 to get power feed from the different power supply.

Let us connect the PDU01 and PDU02 inlet to the power feed. Follow the options from the screenshots. You need to click on green colored connection icon and select Power Feed .

Connect Rack01/PDU01 PDU/P01 (R01/PDU01/P01) to Power Feed

### A Side

Region	APNIC-HQ
Site	First APNIC Lab
Rack	APNICHQ/Rack01
Device	Rack01/PDU01
Type	Power port
Name	PDU/P01 (R01/PDU01/P01)



### B Side

Region	APNIC-HQ
Site	First APNIC Lab
Rack Group	
Power Panel	APNIC-DC-Power
Type	Power feed
Name	APNICDC/UPS-A/R01

### Cable

Status	Connected
Type	Power
Label	R01/PDU01/PP
Color	Amber
Length	<input type="text" value="30"/> <input type="text" value="Meters"/>
Tags	

B Side		
Region	APMC-HQ	x -
Site	First APMC Lab	x -
Rack Group	_____	x
Power Panel	APMC-DC-Power	x -
Type	Power feed	
Name	APMCDCrUPS-Ju01	x -

Cable	
Status	Connected
Type	Power
Label	R01PC001PP
Color	Amber
Length	30 Meters
Tags	

Device: **Power Ports** **Power Outlets** Status LLDP Neighbors Configuration Config Content Change Log

Power Ports							
Name	Label	Type	Maximum draw	Allocated draw	Description	Cable	Connection
Rack01/PDU02/Port02	R01/PDU02P01	NEMA 5-15P	1	—	—	—	—

Power Outlet  
Power Feed

Connect Rack01/PDU02 Rack01/PDU02/Port02 (R01/PDU02/P01) to Power Feed

A Side	
Region	APNIC-HQ
Site	First APNIC Lab
Rack	APNICHQ/Rack01
Device	Rack01/PDU02
Type	Power port
Name	Rack01/PDU02/Port02 (R01/PDU02/P01)

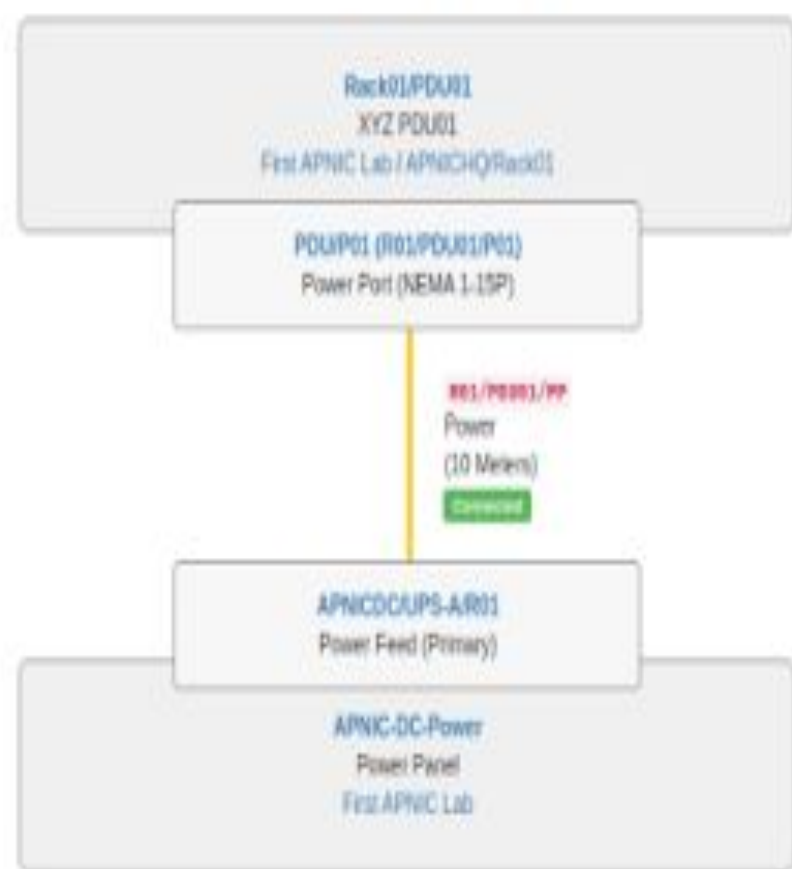


B Side	
Region	APNIC-HQ
Site	First APNIC Lab
Rack Group	
Power Panel	APNIC-DC-Power-Sec
Type	Power feed
Name	APNICDCUPS-BR01

Cable	
Status	Connected
Type	Power
Label	R01/PDU02/PPSec
Color	Dark orange
Length	10 Meters
Tags	

Let us check the connection from PDU to power feed.

## Cable Trace for Power Port PDU/P01 (R01/PDU01/P01)



### Related Paths

Origin	Destination	Segments
None found		

Trace completed

Total segments: 1

Total length: 10 Meters



## Add a few components to the server

Let us add few components for the device, first we add few components for server-01, Selecting SRV01 from the Devices tab, choose Power Ports from the Add Components drop down menu. Power ports are named like - Rack01/SRV01/Port01 .

To add Interfaces , again click Add Components and give it a name Eth0 with 1GE from Types .

Power port

Device	SRV01
Name	<input type="text" value="Rack01/SRV01/Port01"/>
Label	<input type="text" value="R01/SRV01/P01"/> <small>Physical label</small>
Type	<input type="text" value="NEMA 1-15P"/> <small>Physical port type</small>
Maximum draw	<input type="text" value="1"/> <small>Maximum power draw (watts)</small>
Allocated draw	<input type="text" value="Allocated draw"/> <small>Allocated power draw (watts)</small>
Description	<input type="text" value="Description"/>
Tags	<input type="text" value=""/>

## Interface

Device

Name

Alphanumeric ranges are supported for bulk creation. Mixed cases and types within a single range are not supported. Examples:

- [ge,ae]-0/0/[0-9]
- e[0-3][a-d,f]

Label

Alphanumeric ranges are supported. (Must match the number of names being created.)

Type

☒ Enabled

Parent LAG

MTU

MAC Address

Description

☐ Management only

This interface is used only for out-of-band management

Mode

Tags

Create

Create and Add More









Cancel








Add one more power port.

Now connect those two Power Ports with the PDU unit 01 and 02 accordingly, use the option power outlet to make the connection and check the status. Power cable tagging can be done following Rack/Server/Power\_port/PDU\_number/Port\_number

Device | Interfaces | **Power Ports** | Status | LLDP Neighbors | Configuration | Config Context | Change Log

Power Ports Configure

Name	Label	Type	Maximum share	Allocated share	Description	Cable	Connection	
<input type="checkbox"/> Rack01SRV01Pwr01	R01SRV01P01	NEMA 5-15P	1	—	—	R01SRV01P01PDU01P01	Rack01PDU01 -> Plug (Plug1)	   
<input type="checkbox"/> Rack02SRV01Pwr02	R02SRV01P02	NEMA 5-15P	1	—	—	—	—	   

Power Outlet

Power Feed



Connect SRV01 Rack01/SRV01/Port02 (R01/SRV01/P02) to Power Outlet

**A Side**

Region: APAC-HQ

Site: FirstAPAC Lab

Rack: APAC-HQ/Rack01

Device: SRV01

Type: Power port

Name: Rack01/SRV01/Pwr02 (R01/SRV01/P02)

**B Side**

Region: APAC-HQ

Site: FirstAPAC Lab

Rack: APAC-HQ/Rack01

Device: Rack01PDU02

Type: Power outlet

Name: Plug2

**Cable**

Status: Connected

Type: Power

Label: R01SRV01P01PDU02P01

Color: Red

Length: 3 Meters

Tag:

Next, let us add few ports to the switch, that we have created. It will be time consuming to add 24 or 48 ports, to simplify the LAB we will add 8 ports only to the Cisco Nexus 3550 switch, dont forget to add two power port for switch, and connect from two separate PDU as well.

Go to SWC01 from the Devices tab, and click on Add Components to add Interfaces . Naming can be done e01, e02, e03 , select 1000BASE-T (1GE) from the Type option. After creating all the 8 ports it should look like -

netbox Organization ▾ Devices ▾ IPAM ▾ Virtualization ▾ Circuits ▾ Power ▾ Secrets ▾ Other ▾

Devices ▾ First APNIC Lab ▾ SWC01

SWC01

Created Dec 21, 2020 | Updated 1 day, 13 hours ago

Device ▾ Interfaces 8 ▾ Status ▾ LLDP Neighbors ▾ Configuration ▾ Config Context ▾ Change Log

Interfaces											
	Name	Label	Enabled	Type	LAG	MTU	Mode	Description	Cable	Connection	IP Addresses
<input type="checkbox"/>	e01	e01	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<a href="#">+</a> <a href="#">-</a> <a href="#">i</a> <a href="#">t</a> <a href="#">e</a> <a href="#">d</a>
<input type="checkbox"/>	e02	e02	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<a href="#">+</a> <a href="#">-</a> <a href="#">i</a> <a href="#">t</a> <a href="#">e</a> <a href="#">d</a>
<input type="checkbox"/>	e03	e03	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<a href="#">+</a> <a href="#">-</a> <a href="#">i</a> <a href="#">t</a> <a href="#">e</a> <a href="#">d</a>
<input type="checkbox"/>	e04	e04	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<a href="#">+</a> <a href="#">-</a> <a href="#">i</a> <a href="#">t</a> <a href="#">e</a> <a href="#">d</a>
<input type="checkbox"/>	e05	e05	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<a href="#">+</a> <a href="#">-</a> <a href="#">i</a> <a href="#">t</a> <a href="#">e</a> <a href="#">d</a>
<input type="checkbox"/>	e06	e06	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<a href="#">+</a> <a href="#">-</a> <a href="#">i</a> <a href="#">t</a> <a href="#">e</a> <a href="#">d</a>
<input type="checkbox"/>	e07	e07	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<a href="#">+</a> <a href="#">-</a> <a href="#">i</a> <a href="#">t</a> <a href="#">e</a> <a href="#">d</a>
<input type="checkbox"/>	e08	e08	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<a href="#">+</a> <a href="#">-</a> <a href="#">i</a> <a href="#">t</a> <a href="#">e</a> <a href="#">d</a>

[Add Interface](#) [Add Component](#) [Delete](#) [Delete](#) [Add Interface](#)

Let us connect the server ethernet port to the switch port. click on the connect icon, choose interface , a window will popup, A Side is the server side, and B Side is the destination side, for us here it is the switch that we have in our rack-01. Choose swc01 the Device option, and then chose one port below to the Interface .

From the Cable box, select CAT6 from the Type , use Label like we discuss at our presentation slides, APNICHQ/R01/SRV01/APNICHQ/R01/SWC01/e01 (Format : Source\_Device\_ID/Destination\_Device\_ID-Port\_Number/Name) .

Interfaces											Filter	Configure
<input type="checkbox"/>	Name	Label	Enabled	Type	LAG	MTU	Mode	Description	Cable	Connection	IP Addresses	
<input type="checkbox"/>	Eth01	Eth01	<input checked="" type="checkbox"/>	1000BASE-T (10G)	—	1500	—	—	—	—		<a href="#">Add</a> <a href="#">Edit</a> <a href="#">Refresh</a> <a href="#">Up</a> <a href="#">Down</a> <a href="#">Delete</a>
<a href="#">Refresh</a> <a href="#">Add</a> <a href="#">Document</a> <a href="#">Delete</a>												

Interface  
 Front Port  
 Rear Port  
 Circuit Termination

### Connect SRV01 Eth01 (Eth01) to Interface

A Side

Region: APNIC-HQ

Site: First APNIC Lab

Rack: APNIC-HQ/Rack01

Device: SRV01

Type: Interface

Name: Eth01 (Eth01)

B Side

Region: APNIC-HQ

Site: First APNIC Lab

Rack: APNIC-HQ/Rack01

Device: SW001

Type: Interface

Name:

Cable

Status: Connected

Type:

Label:



**Cable**

Status	Connected	
Type	CAT6	
Label	APNICHQ/R01/SRV01/APNICHQ/R01/SWC01/e01	
Color	Blue	
Length	1	Meters
Tags		

Connect

Cancel

Now it should look like below, to check this status, click on the **Trace** icon from the **SRV01 Interface** details.

### Cable Trace for Interface Eth01 (Eth01)



Related Paths		
Origin	Destination	Segments
None Found		

Trace completed

Tensile strength, N

Training concepts: 1. Memory

So, till now, we have created a server and switch; gave them redundant power supply and network interface, and placed them inside the rack.

# IP Address Management

## 11. Explore the NetBox service - IPAM

Now we will work on IPAM, and then go back to DCIM to see the full picture.

- Create Aggregates
- Create Prefixes
- Create IP address

### Create Aggregates:

First, select RIRs from the IPAM tab, and create new one with APNIC

The screenshot shows the NetBox web interface. The top navigation bar includes the NetBox logo and tabs for Organization, Devices, IPAM (selected), Virtualization, Circuits, Power, Secrets, and Other. A search bar and a user profile icon are on the right. The main content area is titled 'RIRs' and shows a table with columns 'Name' and 'Description'. Below the table, it says 'No RIRs found'. On the right side of the main area, there are buttons for 'Add', 'Import', and 'Export'. A search panel on the far right has a search bar and 'Apply' and 'Clear' buttons. The left sidebar menu is open, showing a list of IPAM-related items: IP addresses, IP Addressspace, Prefixes, Prefix/VLAN Ranges, Aggregates, RIRs (highlighted), VRFs, Route Targets, VRFs, VLANs, VLAN Groups, and Services. Each item has a green plus icon and a blue minus icon.

## Add a new RIR

RIR

Name

APNIC

Slug

apnic

URL-friendly unique shorthand

☐ Private

IP space managed by this RIR is considered private.

Description

Description

Create

Create and Add Another

Cancel

It will take you to a new window, where you have to create Aggregate IPs. Here we assume the IP Prefix is 10.0.0.0/8 .

### Add a new aggregate

**Aggregate**

Prefix

10.0.0.0/8

IPv4 or IPv6 address

ASR

APNAC

Date added

2020-12-25

Description

APNAC Data Center LAB IPs

**Tenancy**

Tenant group

Tenant

DC Management

**Tags**

Tags

Create

Create and Add Another

Cancel



## Create Prefixes

Select **Prefixes** from the **IPAM** tab to add new prefixes. we will use **10.20.0.0/16** as our prefix for the Data Center.

### Add a new prefix

**Prefix**

**Prefix**

10.20.0.0/16

IPv4 or IPv6 network with mask

**Status**

Active

Operational status of this prefix

**VRF**

**Role**

**Description**

Data Center IPs

☐ **Is a pool**  
All IP addresses within this prefix are considered usable

So the prefix window will showup, there you can see different sub-tab; go to the **Child Prefixes** , and create a new one **10.20.20.0/24** for **Media Service Solution**

## Add a new prefix



### Prefix

Prefix

10.20.20.0/24

IPv4 or IPv6 network with mask

Status

Active

Operational status of this prefix

VRF

\_\_\_\_\_

Role

\_\_\_\_\_

Description

Media Service Solution IPs

☐ Is a pool

All IP addresses within this prefix are considered usable

You will see the window like this.

netbox Organization + Devices + IPAM + Virtualization + Circuits + Power + Secrets + Other +

Search

Prefixes 10.20.0.0/16

Search prefixes

+ Add Child Prefix + Clone Edit Delete

Created (Nov 24, 2024) Updated 3 minutes ago

Prefix Child Prefixes 1 IP Addresses 0 Change Log

Show available Hide available

Child Prefixes

Prefix	Status	Children	VRF	Utilization	Tenant	Site	VLAN	Role	Description
10.20.0.0/26	Active	—	Global	—	—	—	—	—	—
10.20.16.0/27	Active	—	Global	—	—	—	—	—	—
+ 10.20.20.0/24	Active	0	Global	0%	DC Management	First APN4C Lab	—	—	Media Service Solution IPs
10.20.21.0/24	Active	—	Global	—	—	—	—	—	—
10.20.22.0/27	Active	—	Global	—	—	—	—	—	—
10.20.24.0/27	Active	—	Global	—	—	—	—	—	—
10.20.30.0/24	Active	—	Global	—	—	—	—	—	—
10.20.64.0/18	Active	—	Global	—	—	—	—	—	—
10.20.128.0/17	Active	—	Global	—	—	—	—	—	—

+ Add Prefix + Create Prefix

10 per page Showing 1 of 1

Click on the child-prefix that we just now defined from the go to the IP Addresses sub-tab. And create a IP for the first server as 10.20.20.10/30 .

## Add a new IP address



New IP

Bulk Create

### IP Address

Address

10.20.20.10/30

IPv4 or IPv6 address (with mask)

Status

Active

The operational status of this IP

Role

\_\_\_\_\_

The functional role of this IP

VRF

\_\_\_\_\_

DNS Name

DNS Name

Hostname or FQDN (not case-sensitive)

Description

Rack01/Server01

You will get a window like below to see the status.

10.20.20.10/30

Created Dec 22, 2022 · Updated 10 minutes ago

IP Address [Change Log](#)

IP Address	
Family	IPv4
VDC	Global
Tenant	OC Management
Status	Active
Role	None
DRG Name	---
Description	RedOL/ServerOS
Assignment	---
NAT (enable)	None
NAT (outside)	None

Tags
No tags assigned

Related Profiles							
Profile	Status	Tenant	Site	VLAN	Role	Description	
10.20.0.0/24	Active	OC Management	Red APNOC Lab	---	---	Data Center IPs	
10.20.20.0/24	Active	OC Management	Red APNOC Lab	---	---	Media Service Solution IPs	

Related IP Addresses	
None	

1/1 page

Now, let's go back to the DCIM module, and assign an IP to the server 01 interface.

To do that, select `srv01` from the `Devices` lists, go to the sub-tab `Interfaces` and click on the green `+` sign, to add the IP address. It will take you to a new page, provide all the info accordingly.

Devices / Red APNOC Lab / SRV01

Search devices

[+ Add Component](#) [+ Clone](#) [Edit](#) [Delete](#)

## SRV01

Created Dec 22, 2022 · Updated 10 minutes ago

[Device](#) [Interfaces](#) [Power Ports](#) [Status](#) [LLDP Neighbors](#) [Configuration](#) [Config Context](#) [Change Log](#)

Interfaces										Filter	Configure
<input type="checkbox"/>	Name	Label	Enabled	Type	LAC	MTU	Mode	Description	Cable	Connection	IP Addresses
<input checked="" type="checkbox"/>	Eth0/1	Eth0/1	<input checked="" type="checkbox"/>	100BASE-T (10G)	---	1500	---	---	APNOC-HQ-Red-OL-SRV01-APNOC-HQ-Red-OL-SRV01-eth0/1	Srv01 > eth0 (eth1)	<a href="#">+</a> <a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Add IP address</a>

[+ Add Component](#) [+ Clone](#) [Edit](#) [Delete](#)

## Add a new IP address



New IP

Assign IP

### IP Address

Address

10.20.20.232

IPv4 or IPv6 address (with mask)

Status

Active

The operational status of this IP

Role

The functional role of this IP

VRF

DNS Name

DNS Name

Hostname or FQDN (not case-sensitive)

Description

Web Service IP

### Interface Assignment

Device

Virtual Machine

Device

SRV01

Interface

Eth01 (Eth01)

☒ Make this the primary IP for the device/VM

So, as of now our one server is connected with a switch, and both the devices are connected with the power source.