Data Center Automation Using Juniper Apstra Freeform

Education Services

COURSE OVERVIEW

This five-day course provides students with the foundational knowledge required to work with the Juniper Apstra Freeform reference design and to manage networks with Juniper Apstra software. This class expects that the attendees have the knowledge to use Jinja2 templates.
The course covers the overall concept of intent-based networking, the Juniper Apstra architecture, the high-level differences between the Data Center and Freeform reference designs, navigation of both the global and blueprint Apstra UI as well as introduce students to device profiles, installing device agents, device management (including ZTP of devices), role-based access control (RBAC), REST API, creating tags, creating resources, and enabling syslog. The course goes on to cover the Juniper Apstra freeform reference architecture including the designing, building, deploying, and automation of a network using configuration templates, property sets, and device context. After teaching you to use Juniper Apstra Freeform reference architecture to build a running network, the course reviews the operational tools for managing a system with Juniper Apstra including basic troubleshooting, deploy modes mode, adding and removing devices from a network, rolling back an entire network (Time Voyager), and using Intent-based Analytics (IBA).
Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring an IP fabric using Juniper Apstra's Freeform features. This course is based on Juniper Apstra Release 4.1.2.

COURSE LEVEL

Advanced

AUDIENCE

The primary audiences for this course include:

- Networking architects and operators, system engineers, DevOps and IT professionals
- Individuals responsible for configuring, monitoring, and troubleshooting modern networks of any size leveraging Junos hardware and Junos OS

PREREQUISITES

- Strong background in networking and data center designs
- Understanding of Clos IP fabric
- Routing protocol design, configuration, and performance
- Overlay/underlay routing designs
- Basic automation design and workflows
- An understanding of Junos device configuration via CLI
- Strong background in Jinja templating
- Basic automation tools like Python or Ansible
- Border Gateway Protocol (BGP) knowledge is recommended but not required

CONTACT YOUR REGIONAL EDUCATION SERVICES TEAM:

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OBJECTIVES

- Describe what is meant by intent-based networking.
- Describe the Juniper Apstra architecture.
- Navigate the global Apstra UI.
- Describe device profiles.
- Create and use system agents to manage devices.
- Describe the difference between the data center and freeform reference designs.
- Navigate the blueprint UI (both DC and Freeform).
- Configure role-based access control (RBAC).
- Describe basic REST API functionality.
- Create resources.
- Create tags.
- Configure logging to a remote syslog server.
- Describe the benefits of the Freeform reference design.
- Discuss how templates are used for Junos automation.
- Create Jinja2 templates.
- Describe how to create a config template.
- Describe the minimum steps to deploy a Freeform blueprint.
- Perform the steps to create a running Freeform Blueprint.
- Describe the usage of device context and property sets.
- Explain the behavior of a central routing and bridging (CRB) DC.
- Describe the configuration of a CRB-based DC.
- Describe how to define intent for the CRB use case.
- Describe how to use the default config templates for the CRB use case.
- Describe how to enable basic routing in the CRB use case.
- Describe how to enable VXLAN networks in the CRB use case.
- Describe how to route between overlay VXLAN networks in the CRB use case.
- Perform day 2 operations by modifying device context.
- Perform day 2 operations by modifying config templates.
- Use the Graph Explorer to traverse the graph datastore.
- Describe the function of an IBA probe.
- Create an IBA probe.

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COURSE CONTENTS

DAY 1

1 Course Introduction

2 Intent-Based Networking

- What do we mean by intent?
- Where is Juniper Apstra positioned?

3 Juniper Apstra Overview

- Juniper Apstra server
- Juniper Apstra device agents

4 Apstra UI Walkthrough

- Navigate the global Apstra UI

Lab 1: Apstra UI Walkthrough

5 Device Profiles

- Describe Device Profiles

Lab 2: Device Profiles

6 Device Management

- Device profiles as a hardware compatibility list
- Install off-box agents
- Install on-box agents
- Perform ZTP

Lab 3: Managing Devices

7 Data Center Reference Design Versus Freeform Reference Design

- DC reference design overview
- Freeform reference design overview

DAY 2

8 Navigating the Blueprint UI

- Navigate the tabs – Dashboard, Analytics, Staged, Uncommitted, Active, and Time Voyager
- Describe the layered views of the staged and active networks
- IBA probe versus service anomalies

9 Role-Based Access Control

- Configure users, roles, and providers to enable local and remote authentication

Lab 4: Navigating the Blueprint UI and RBAC

10 Introduction to the REST API

- Describe how to use the Juniper Apstra REST API

11 Resources

- Create IP, VNI, and ASN pools

12 Tags

- Create Tags

Lab 5: REST API, Resources, and Tags

13 Syslog

- Configure and monitor logging to a remote syslog server

Lab 6: Syslog

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COURSE CONTENTS (continued)

DAY 3

14 Jinja Review

- Jinja2 Overview
- Jinja2 with Python example
- Loading templates from the file system
- Jinja2 syntax basics
- Variable expansion
- For loops
- Conditionals
- Math and logic operators
- Comparison and other operators
- Filters
- Include directive
- Set directive

Lab 7: Jinja Review

15 Config Templates

- Global config templates
- Default config templates
- Templating methodologies
- Importing a config template
- Config template REST API calls

16 Deploy a Freeform Blueprint

- Minimum requirements to deploy a Freeform blueprint
- Direct config example
- Importing device profiles
- Editing the topology
- Design your network topology
- Build your network topology
- Verify the rendered configurations
- Deploy the blueprint
- Verify your network with the Apstra UI

Lab 8: Deploying a Freeform Blueprint

DAY 4

17 Device Context and Property Sets

- Changing hostname in the UI
- Creating a more accurate topology diagram
- Creating property sets
- Viewing the device context
- Viewing telemetry versus intent
- Including the junos_system.jinja and junos_protocols.jinja config template
- System REST API calls
- Link REST API calls
- Device context and property set REST API calls

Lab 9: Device Context and Property Sets

18 CRB Use Case — Overview

- CRB theory
- CRB Junos configuration

19 CRB Intent and Default Config Templates

- Steps to define your intent (systems, hostnames, links, IP addressing, and tags)
- Importing device profiles
- Creating tags
- Creating internal systems
- Creating external systems
- Creating links
- Using the default config templates
- Creating a “root” template
- Deploying the initial blueprint

Lab 10: Creating Intent, Context, and Root Template for CRB

20 CRB Intent and Default Config Templates

- Steps to enable basic routing
- Create property sets for AS numbers, loopback addresses, and routing instances
- Create config template for loopback interfaces
- Create config template for routing options
- Create config template for policy options
- Create config template for BGP peering
- Instantiate a predefined IBA probe (BGP flapping)

Lab 11: Basic Routing for CRB

21 L2 Overlay Networking for CRB

- Steps to enable overlay VXLAN networks
- Create a vlan property set
- Create config template for switch options
- Create config template for VXLAN overlay networks

Lab 12: Layer 2 Overlay Networking for CRB

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COURSE CONTENTS (continued)

DAY 5

22 Layer 3 Overlay Networking for CRB

- Steps to enable routing between VXLAN networks
- Update vlan property set with IP addressing for IRB interfaces
- Create a subinterface property set
- Create config template for external router facing subinterfaces
- Create config template for routing instances

Lab 13: Layer 3 Overlay Networking for CRB

23 Day 2 Operations

- Day 2 operations overview
- Move a server by modifying a property set
- Enable drain mode functionality by modifying config templates

Lab 14: Day 2 Operations

24 Graph Explorer

- Graph datastore overview
- Accessing the graph explorer
- Freeform reference design schema
- Graph of a running blueprint
- Using the graph explorer to find a node
- Querying the graph

25 Intent-Based Analytics Overview

- What is intent-based analytics?
- IBA probe overview
- How to create a probe
- Freeform-specific processors

26 Creating an IBA Probe

- Default probes
- Instantiating a predefined probe
- Creating a new probe

Lab 15: Creating IBA Probes

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