
Migration Automation

Tier 1 ISP

Customers Problem

- Manual migration 26000+ services from existing M320 routers to new MX480/960 routers tedious, cumbersome and error-prone

Interface with Space

- Customer wants to leverage existing Space (Network Management) Platform to perform migrations/configuration changes. A Space based application (Port Migration Tool) is developed to mitigate the problem

Customer Problem

What part of the configuration is needed to only migrate ge-0/0/2?



M Series Switch

```
ge-0/0/1
interfaces {
    ge-0/0/1 {
        unit 10 {
            bandwidth 500m;
            vlan-id 10;
            family inet {
                address 119.225.62.148/30;
            }
        }
    }
    routing-options {
        static {
            route 119.225.143.32/29 {
                next-hop 119.225.62.149;
                community no-export;
            }
        }
    }
}
accounting-options{
    file USAGE-ACCOUNTING {
        ...
    }
    interface-profile INET-IFU {
        file USAGE-ACCOUNTING;
    }
}
firewall {
    family inet {
        filter INET-IN-Block-Martians-and-No-Monitor {
            ...
        }
        policer INET-Policing-BW-8m {
            ...
        }
    }
}
```

Project Challenges

Design

- Limited Core Routing expertise
- Restricted access internal service provisioning toolset
- Limited understanding of design approach
- Lengthy design phase (almost 6-8 weeks)

Development

- Weak Space SDK and API Documentation
- Some Libraries (XML-CurlyBrace format conversion) not available in 13.1 SDK
- Attempted to Port 13.2 Libraries (XML-CurlyBrace format conversion) to 13.1
- Finally Juniper PS helped develop an custom external format conversion tool to solve the problem

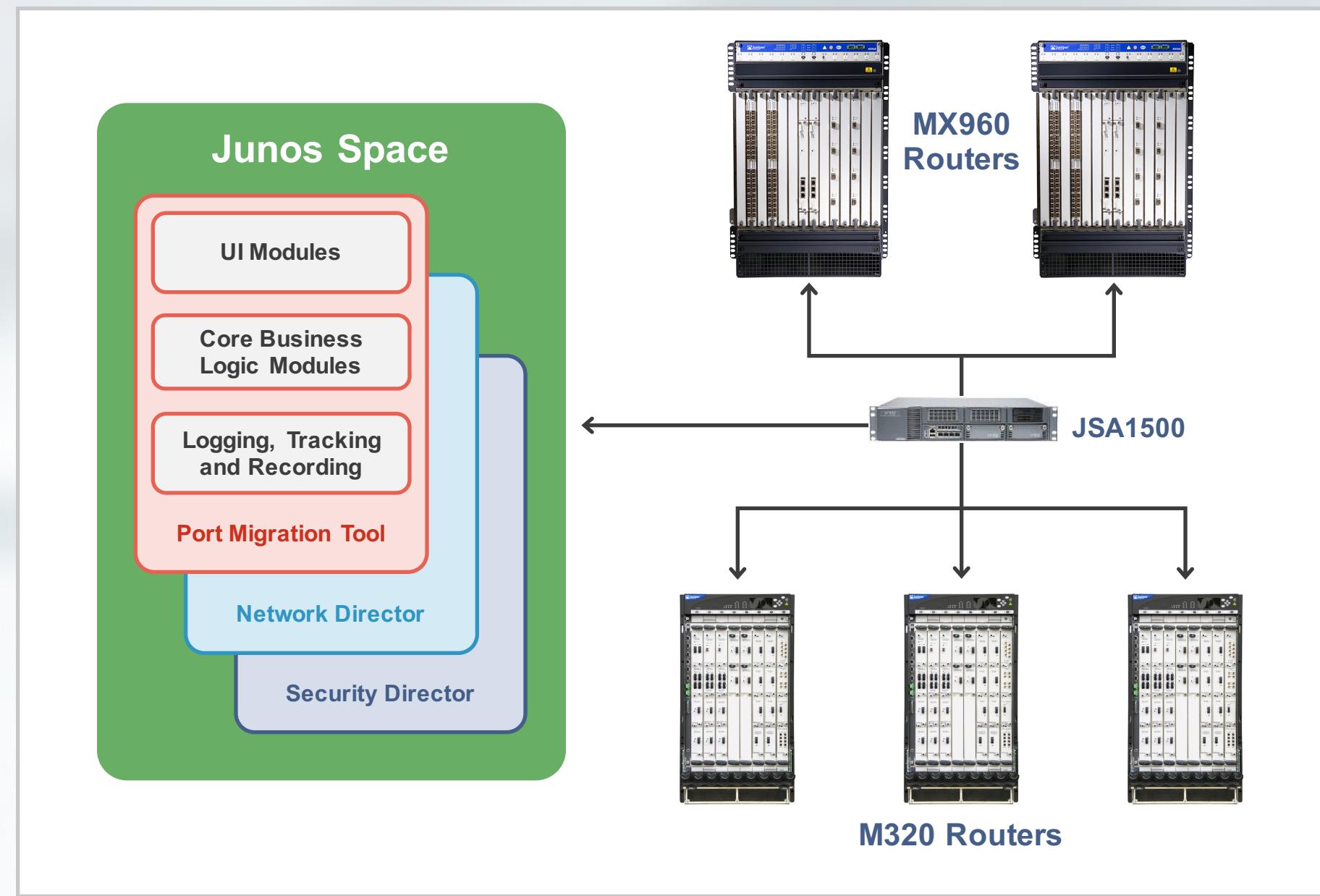
Testing

- Limited access to physical M320 and MX routers
- Restricted access to internal service provisioning toolset
- Lengthy testing phase due to the time zone difference and restricted production grade device access

High Level Port Migration Tool Design

- Requirements:
 - Graphical User Interface
 - Deployed as a plug-in/app inside Junos Space
 - GUI to prompt for selection of single-port or multi-port migration
 - GUI to display two columns: one column for selection of source router/ports; target router/port(s)
 - GUI to have 1 click button to display the transformed configuration and SQL statements
 - GUI to have 1 click button to push the transformed configuration to target router
 - GUI to provide the ability to store and download the transformed config and SQL statements
 - Logs all transactions with date stamp
 - Generate report on each port migration with status of each service

Port Migration Tool Deployment Architecture



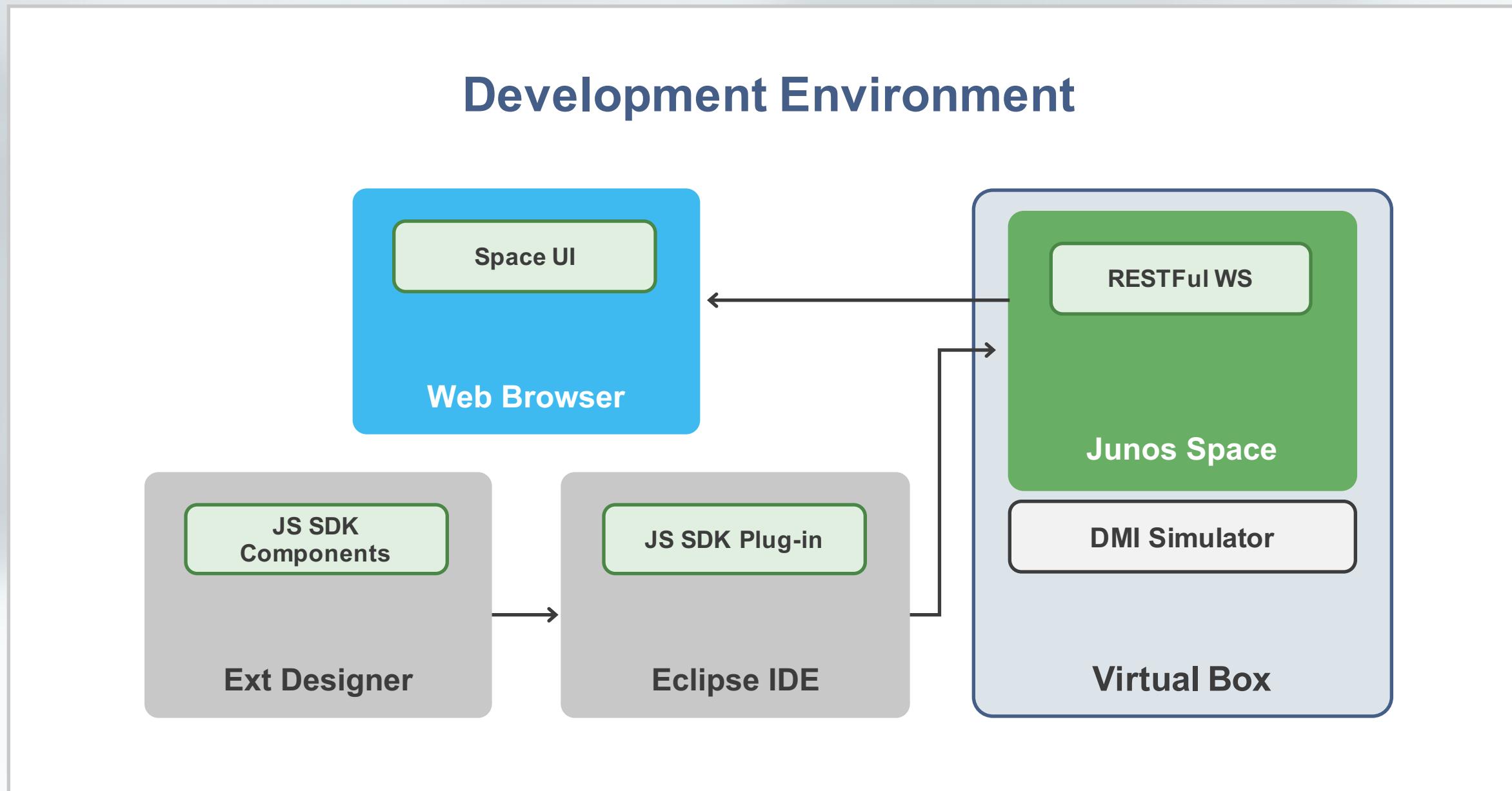
Port Migration Tool Components

- Deployed under existing Junos Space platform running on JSA1500 appliance
- Can be launched from logging into the Junos Space platform
- Requires the source M-Router and target M-Router to be managed by Junos Space platform
- Components:
 - UI Modules: Enables/Guides the user to navigate, provide inputs to the tool and initiate actions
 - Core Business Logic Modules: Business logic to convert/transform/display M-Config to MX-Config. Based on service types
 - Non-Core Business Logic Modules: Logging, Tracking, Reporting functions

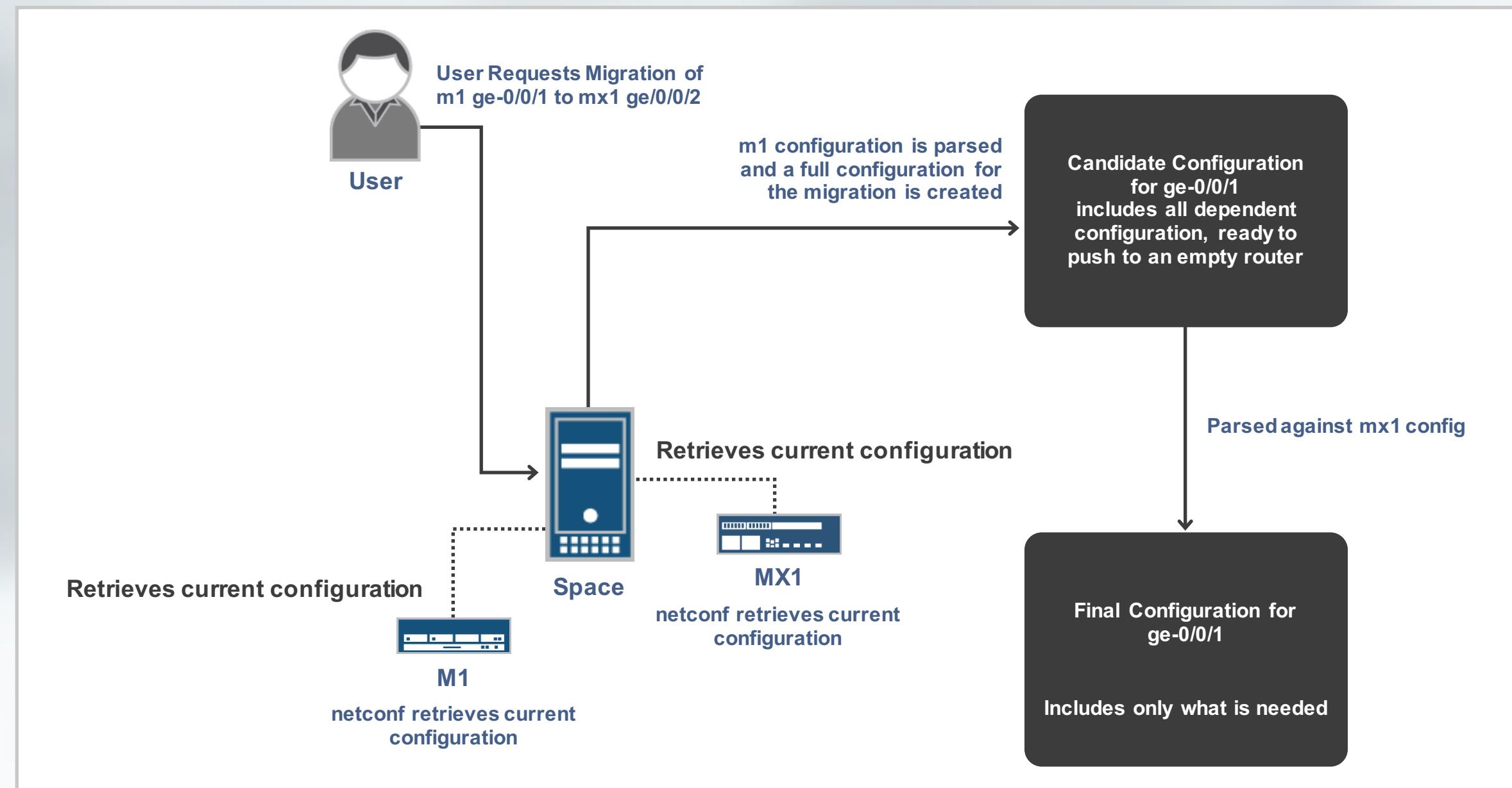
Port Migration Tool Details

- The Migration Tool is developed utilizing:
 - Junos Space 13.1
 - Junos Space SDK
 - Eclipse with Junos Space Plug-in
 - VirtualBox
 - DMI Simulator with virtual MX and M (for initial development)
 - MX and M Routers with Junos 12.3 (for final and DVT)
 - Production M-router configurations used for validation testing

Development Environment



Project Functional Flow



Port Migration Tool in Action

The screenshot shows the Juniper SPACE application interface for port migration. The left sidebar lists applications: Dashboard, MX Migration (selected), Single Port Migration (highlighted), Multi-Port Migration, and Migration Report. The main window title is "MX Migration > Single Port Migration". The central area is titled "Single Port Migration" and contains two main sections: "Source Router" and "Destination Router". Under "Source Router", there are dropdown menus for "Source M Router" (set to "m1") and "Source Port" (set to "m1 : ge-0/0/2"). Under "Destination Router", there are dropdown menus for "Destination MX Router" (set to "mx1") and "Destination Port" (set to "mx1 : ge-0/1/1"). A large blue "Migrate" button is located below these fields. To the right of the routers, there are three expandable sections: "SQL Updates", "Config Changes", and "Remote PE Configuration".

Project Conclusion

- Provided Port Migration Tool to automate the migration of ports from M320 to MX routers
- Delivery
 - Juniper is training and assisting with initial 3 migrations
 - Tool is in production and was successfully put into use to perform multiple production migrations
- Future
 - New version of tool with Auto-push/rollback of configurations to support remote PEs
 - A project is underway to generalize the tool to fit other customers

Data Center Automation

International Bank

Customer's Problem

- Consolidation of global datacenters into 22 new “cloud” locations

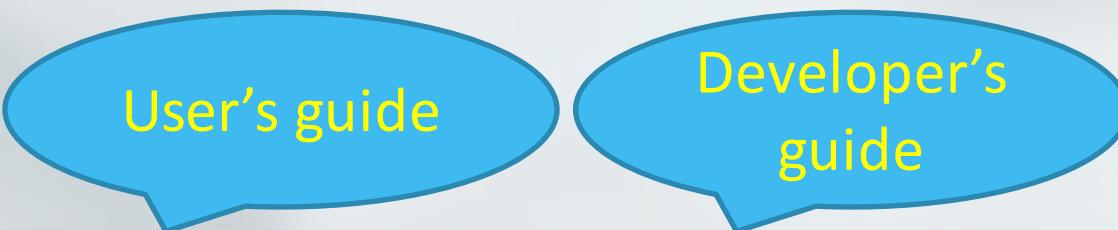
Challenges

- Condensed schedule: 18 months from starting first install to last build finished

Project Solution

- Devices deployed in solution:
- Leverage PyEZ and Ansible to handle device deployment
- Leverage Robot Framework and Jenkins CI tools to automate acceptance tests
- Automation from the start - Automated Test Driven Development
- Future – NITA (Network Implementation and Testing Automation
 - Reusable toolset for future engagements

NITA Architecture



Dummies guide data centre build

Generic data centre templates

NOOB
Framework

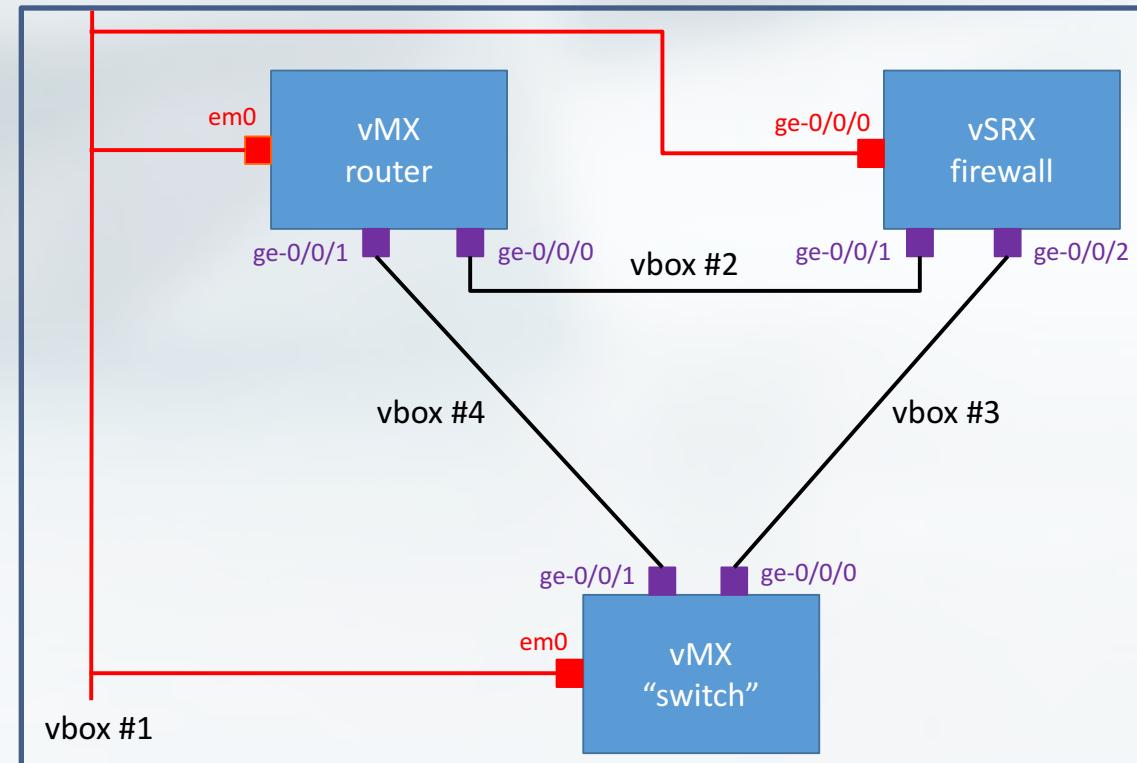
Build
Framework

Test
Framework

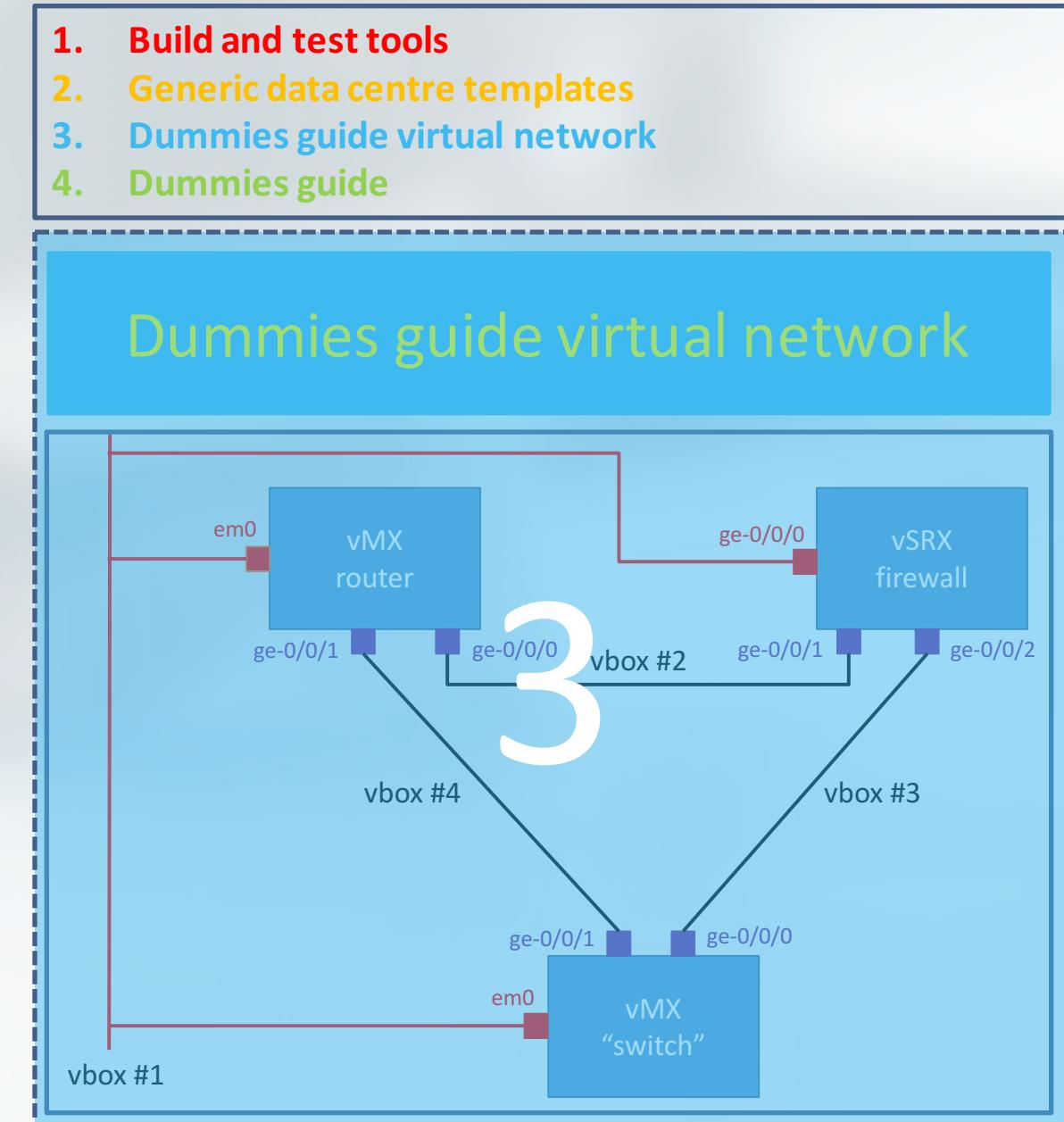
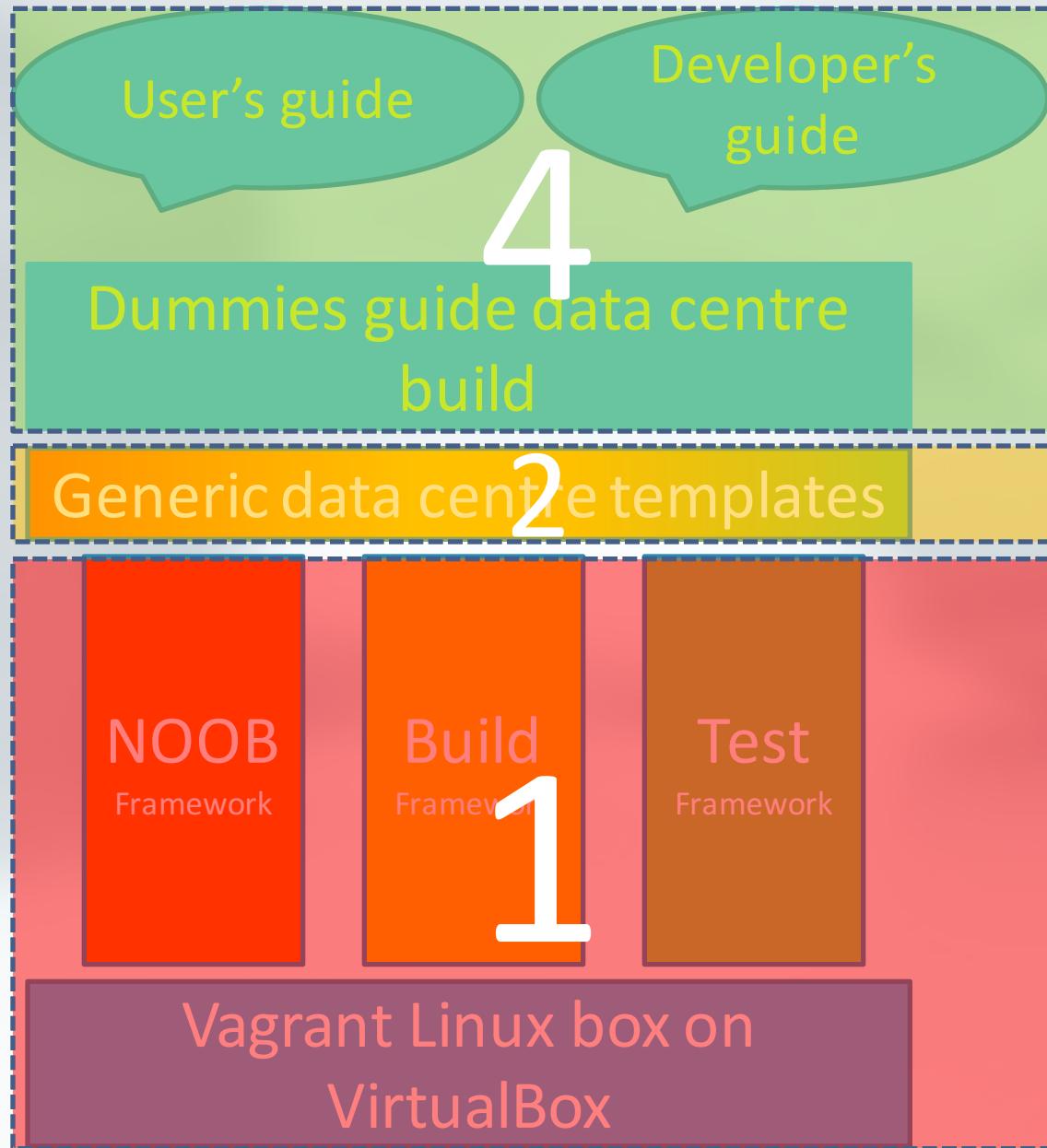
Vagrant Linux box on
VirtualBox



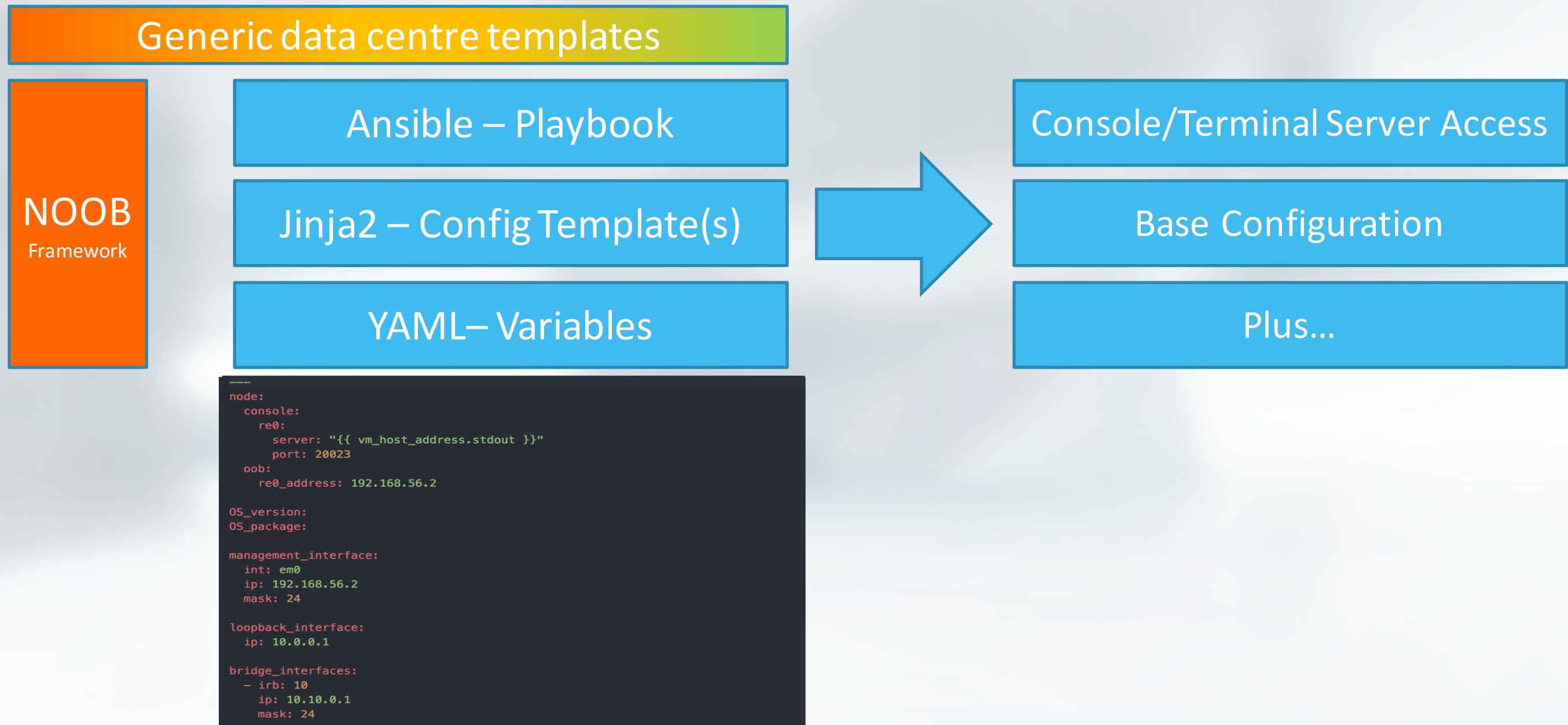
Dummies guide virtual network



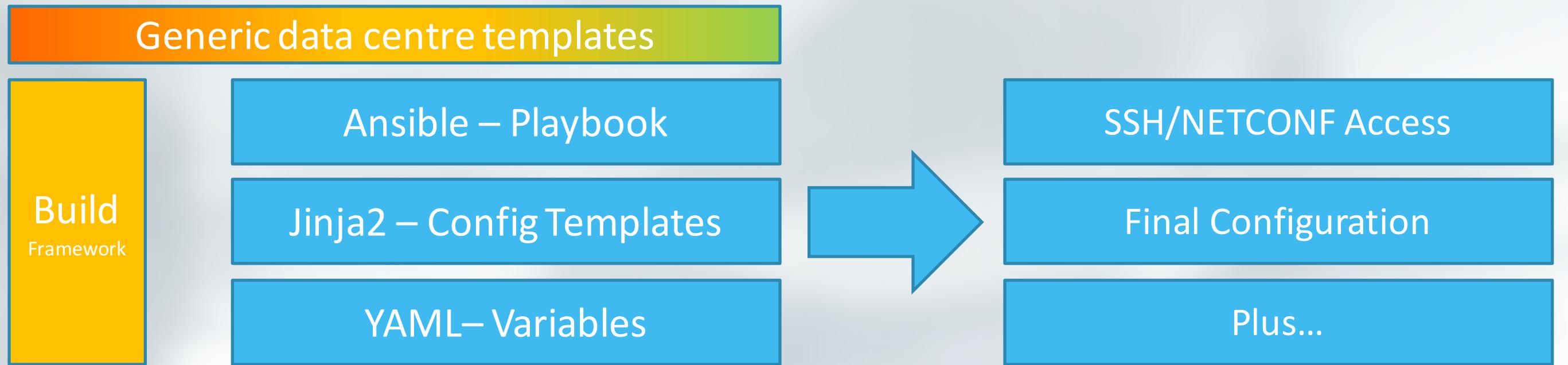
Automation Reuse Components



NOOB Framework



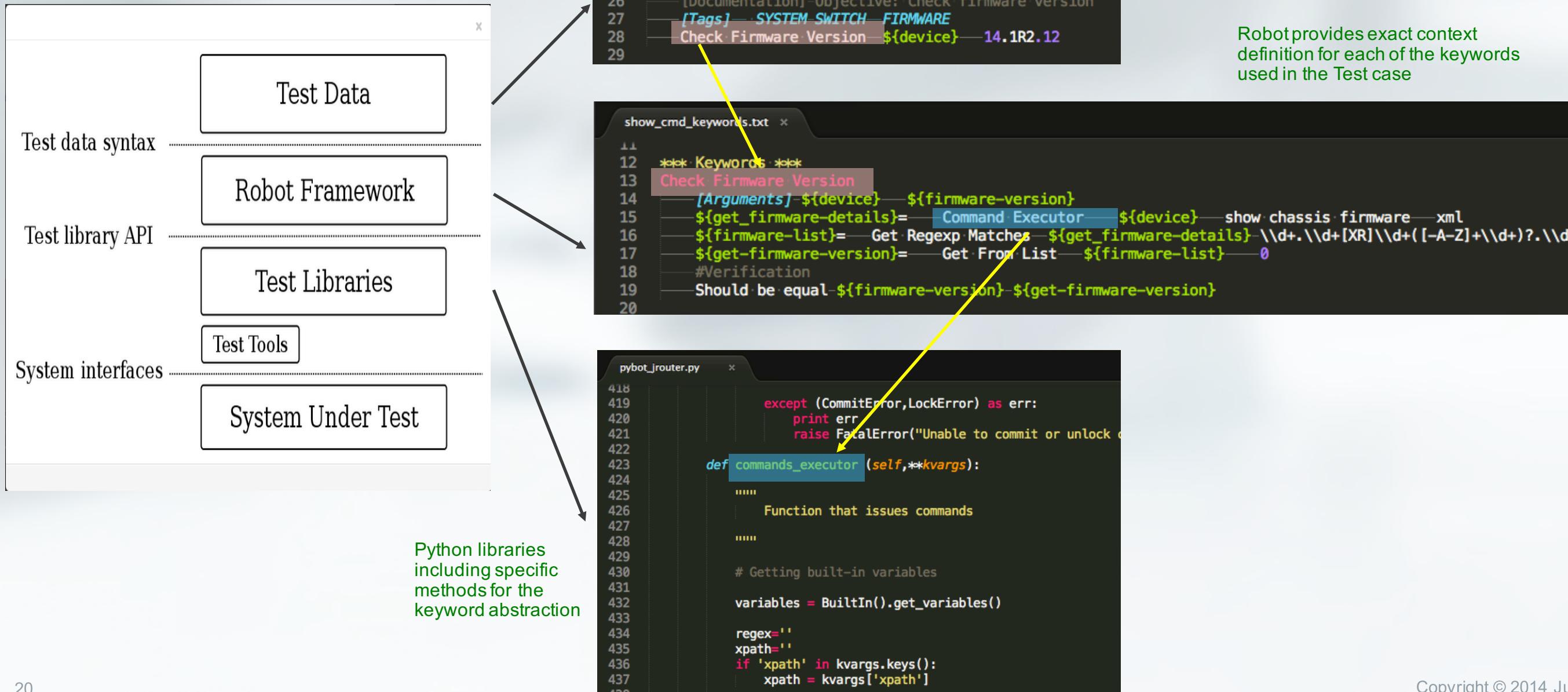
BUILD Framework



```
bridge-domains {  
    VLAN10 {  
        domain-type bridge;  
        vlan-id 10;  
        routing-interface irb.10;  
    }  
}  
protocols {  
    ospf {  
        export OSPF-DEFAULT-ROUTE;  
        area 0.0.0.0 {  
            interface ge-0/0/0.0;  
            interface lo0.0 {  
                passive;  
            }  
        }  
    }  
}  
policy-options {  
    policy-statement OSPF-DEFAULT-ROUTE {  
        from {  
            route-filter 0.0.0.0/0 exact;  
        }  
    }  
}
```

Validation based on Robot Framework

<http://www.robotframework.org>



TEST Framework

Tests Test Log

Test Statistics

Total Statistics		Total	Pass	Fail	Elapsed	Pass / Fail
Critical Tests		83	62	21	00:04:02	
All Tests		83	62	21	00:04:02	
Statistics by Tag						
ALARMS	Total	Pass	Fail	Elapsed	Pass / Fail	
BGP	12	11	1	00:00:01		
CONFIGURATION	1	1	0	00:00:00		
CONNECTIVITY	9	6	3	00:01:18		
FIREWALL	10	9	1	00:00:04		
FIRMWARE	4	4	0	00:00:01		
INTERNAL	5	3	2	00:00:49		
OSPF	1	1	0	00:00:00		
RADIUS	11	6	5	00:00:02		
ROUTER	10	10	0	00:00:04		
SWITCH	10	10	0	00:00:10		
SYSTEM	60	47	13	00:00:09		
SYSTEM CONFIGURATION	3	3	0	00:00:00		
SYSTEM USER	3	3	0	00:00:00		
TACACS	11	6	5	00:00:02		
TOOL_BOX	4	3	1	00:00:29		
USE_CASES	5	0	5	00:02:34		
USER	1	1	0	00:00:00		
VERIFY PROJECT	1	1	0	00:00:00		
VLAN_10	2	0	2	00:01:00		
VLAN_20	2	0	2	00:01:21		
VLAN_30	1	0	1	00:00:14		
WAN	12	9	3	00:00:17		
Statistics by Suite		Total	Pass	Fail	Elapsed	Pass / Fail
Tests		83	62	21	00:04:22	
Tests.00 Verify Project		1	1	0	00:00:00	
Tests.01 Switch		11	11	0	00:00:03	
Tests.02 Router		11	11	0	00:00:02	
Tests.03 Firewall		11	10	1	00:00:02	
Tests.04 Connectivity		9	6	3	00:01:20	
Tests.05 Tacacs		11	6	5	00:00:06	
Tests.06 Radius		11	6	5	00:00:06	
Tests.07 Use Cases		5	0	5	00:02:39	
Tests.08 Ospf		1	1	0	00:00:02	
Tests.09 Bgp		1	1	0	00:00:01	
Tests.10 Wan		11	9	2	00:00:02	

Generated
20160302 14:20:15 GMT 00:00
16 minutes 6 seconds ago

SUITE 01 Switch
Full Name: Tests.01 Switch
Documentation: Switch Test cases
Source: /home/vagrant/dc-dg-build-and-test/test/tests/01_switch.robot
Start / End / Elapsed: 20160302 15:15:53.574 / 20160302 15:15:56.173 / 00:00:02.599
Status: 11 critical test, 11 passed, 0 failed
11 test total, 11 passed, 0 failed

+ **SETUP** device_resources.Device Open Connection \${device}
+ **TEARDOWN** device_resources.Device Close Connection \${device}

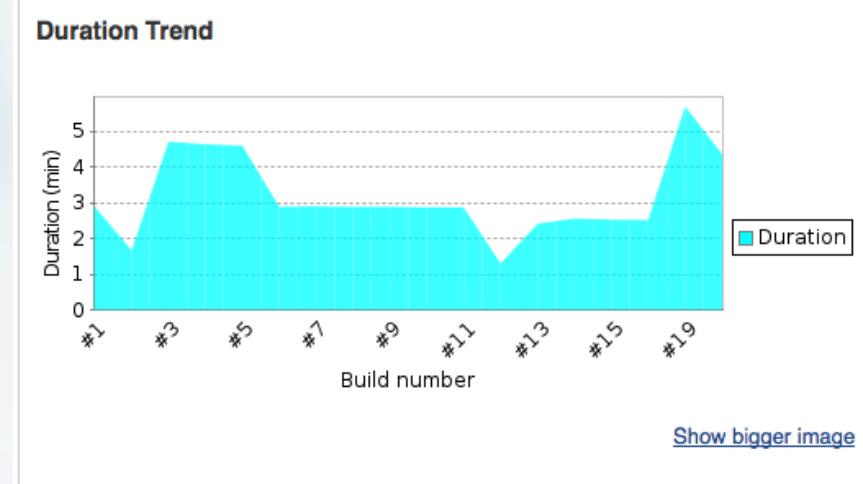
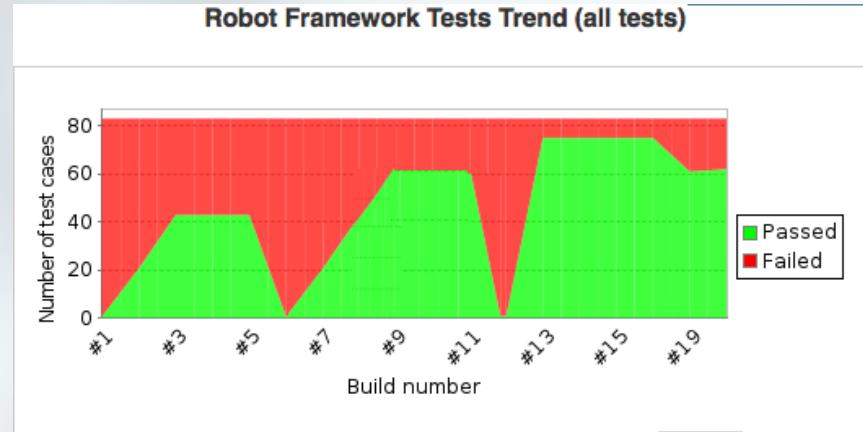
- **TEST** T1.1: CHECK SYSTEM FIRMWARE
Full Name: Tests.01 Switch.T1.1: CHECK SYSTEM FIRMWARE
Documentation: Objective: Check firmware version
Tags: FIRMWARE, SWITCH, SYSTEM
Start / End / Elapsed: 20160302 15:15:54.708 / 20160302 15:15:54.836 / 00:00:00.128
Status: PASS (critical)

- **KEYWORD** show_cmd_keywords.Check Firmware Version \${device}, 14.1R2.12
Start / End / Elapsed: 20160302 15:15:54.709 / 20160302 15:15:54.836 / 00:00:00.127

+ **KEYWORD** \${get_firmware-details} = device_resources.Command Executor \${device}, show chassis firmware, xml
+ **KEYWORD** \${firmware-list} = String.Get Regexp Matches \${get_firmware-details}, \d+\.\d+[XR]\.\d+([-A-Z]+\d+)\?\.\d+
+ **KEYWORD** \${get-firmware-version} = collections.Get From List \${firmware-list}, 0
+ **KEYWORD** BuiltIn.Should Be Equal \${firmware-version}, \${get-firmware-version}
15:15:54.709 TRACE Arguments: [\${device}='switch' | \${firmware-version}='14.1R2.12']
15:15:54.836 TRACE Return: None

Failed Test Cases

Name	Crit.	Duration	Age
Tests.03 Firewall.T3.8: CHECK NO SYSTEM ALARMS	yes	0:00:00.123	20
Tags: ALARMS, FIREWALL, SYSTEM			
Message: One element matching './alarm-summary/active-alarm-count' found.			
+ Tests.04 Connectivity.T4.4: PING TEST BOX-WAN LINK	yes	0:00:15.572	2
+ Tests.04 Connectivity.T4.8: PING TEST WAN-ROUTER LINK	yes	0:00:22.573	2
-			



Frameworks Integration

Jenkins

New Item

People

Build History

Manage Jenkins

Credentials

Build Queue

No builds in the queue.

Build Executor Status

1 Idle

2 Idle

All +

S	W	Name ↓
Grey	Sun	build_vDC
Grey	Sun	noob_vDC
Red	Cloud	RF vDC tests
Grey	Sun	

Icon: [S](#) [M](#) [L](#)

[Changes](#)

[Workspace](#)

[Build Now](#)

[Delete Project](#)

[Configure](#)

[Robot Results](#)

Build #16 (Mar 2, 2016 12:36:43 PM)

Red circle icon

No changes.

Started by anonymous user

Robot Test Summary:

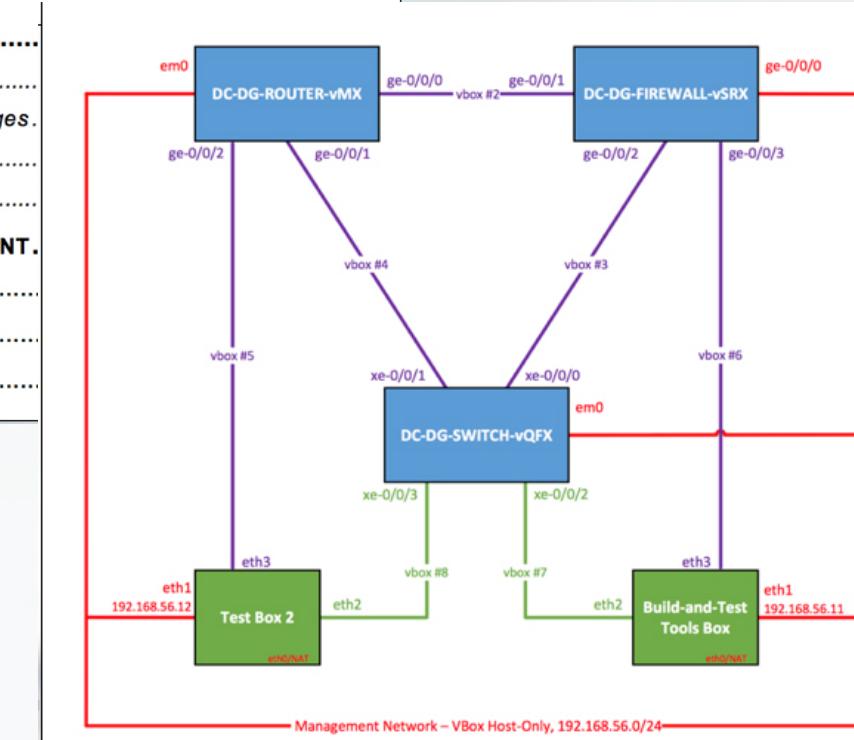
	Total	Failed	Passed	Pass %
Critical tests	83	8	75	90.3
All tests	83	8	75	90.3

- [Browse results](#)
- [Open report.html](#)
- [Open log.html](#)

Documentation

User Guide

2 GETTING STARTED	4
2.1 HARDWARE PREREQUISITES.....	4
2.2 SOFTWARE PREREQUISITES	4
2.3 REPOSITORY CONTENT	5
3 SETTING UP YOUR VIRTUAL DATA CENTER	
3.1.1 Network overview	
3.1.2 Download and placement of vMX, vSRX and vQFX images.	
3.1.3 Manage environment.....	
3.1.4 Verify virtual device Console connectivity	
4 SETTING UP YOUR DEVELOPMENT AND TEST ENVIRONMENT.	
4.1 MANAGE ENVIRONMENT	
4.2 MODULES	
4.3 ADD STATIC HOSTNAME MAPPINGS	



To manually run the NOOB, SSH to the Vagrant box and execute the Ansible playbook directly:

```
cd dc-build-and-test-tools  
vagrant ssh  
cd /home/vagrant/dc-dg-build-and-test  
sudo ansible-playbook -i hosts noob/sites.yaml
```

Note: For the NOOB process to work, make sure the TCP console server is running and the Virtual Network is up.

Following is the output of a successful NOOB process:

```
...  
PLAY RECAP *****  
firewall : ok=7    changed=4    unreachable=0    failed=0  
router  : ok=7    changed=4    unreachable=0    failed=0  
switch  : ok=7    changed=4    unreachable=0    failed=0
```

The assigned management IP addresses after the NOOB process are shown below the management interface names in an updated Virtual Network diagram.

■ xe-0/0/x	Network interface
■ em0	Management interface
vbox #n	Virtualbox internal adapter
■ xe-0/0/	Testing interface

Documentation

Developer Guide

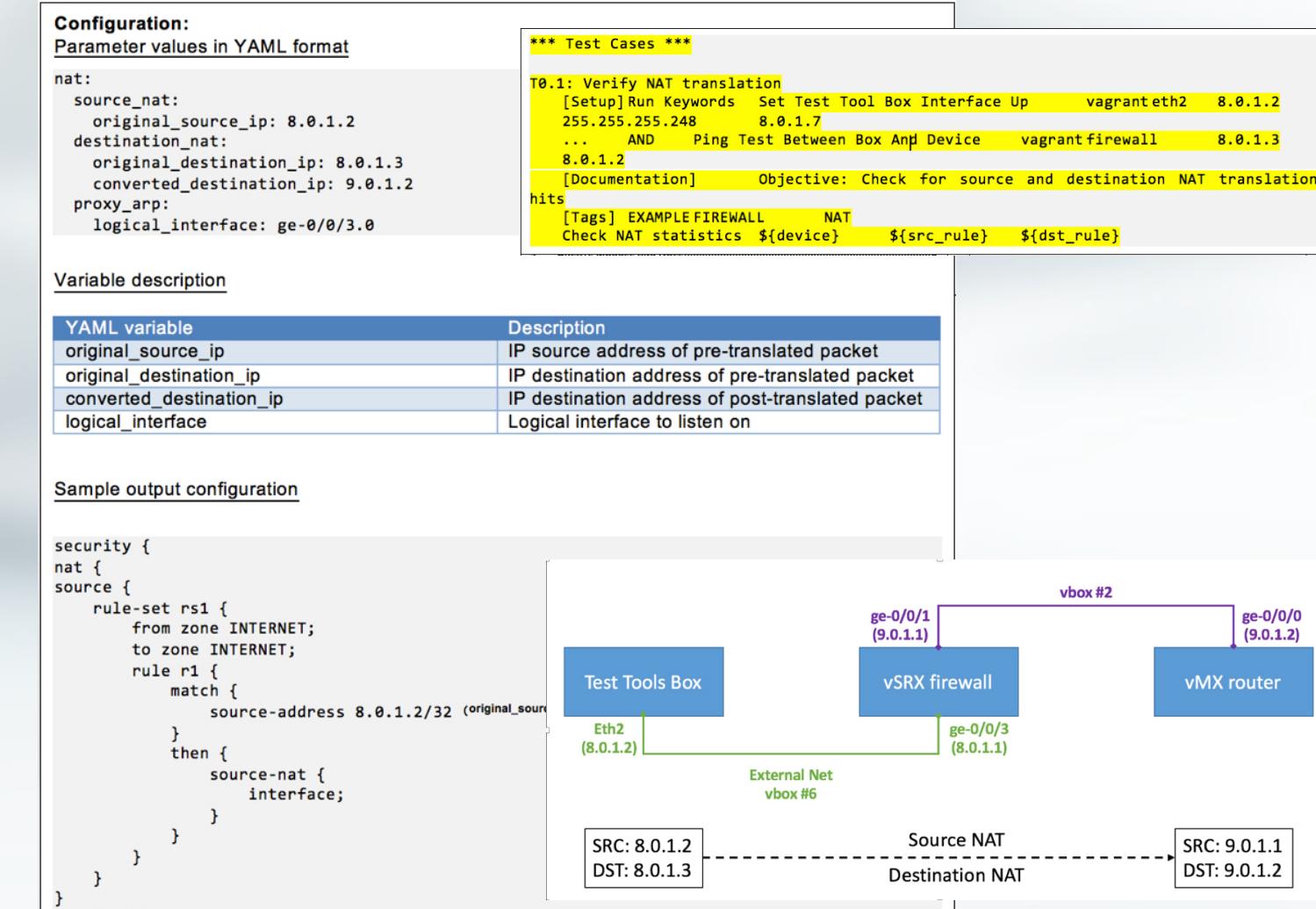
3 DESIGN FOR BUILD CONFIGURATION EXAMPLE.....	6
4 CREATE MODULE AND ROLE.....	9
4.1 CREATE NEW MODULE.....	9
4.2 CREATE NEW ROLE SKELETON	9
5 BUILD CONFIGURATION EXAMPLE.....	10
5.1 CUSTOMIZE NEW ROLE.....	10
5.2 DOCUMENT THE NEW ROLE	15
6 SYSTEM TEST EXAMPLE.....	17
6.1 CREATE A NEW TEST AND KEYWORD.....	17

4.1 Create new Module

To create a new generic module, run the script “create_module.sh” with the module name as an argument. It creates the module with below files and directories. Note that it creates this new module in the directory you run the script from:

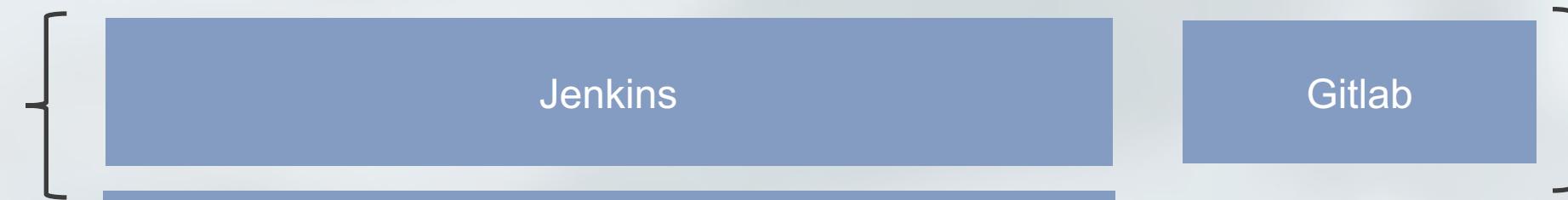
```
cd dc-build-and-test-tools
vagrant ssh
cd /home/vagrant
create_new_module.sh example_module

vagrant@vagrant-ubuntu-trusty-64:~$ find example_module
example_module
example_module/install.sh
example_module/juniper-robot-common
example_module/juniper-robot-common/resource_files
example_module/juniper-robot-common/resource_files/README.txt
example_module/juniper-robot-common/install.sh
example_module/juniper-robot-common/README.txt
example_module/juniper-ansible-build-roles
example_module/juniper-ansible-build-roles/install.sh
example_module/juniper-ansible-build-roles/README.txt
```



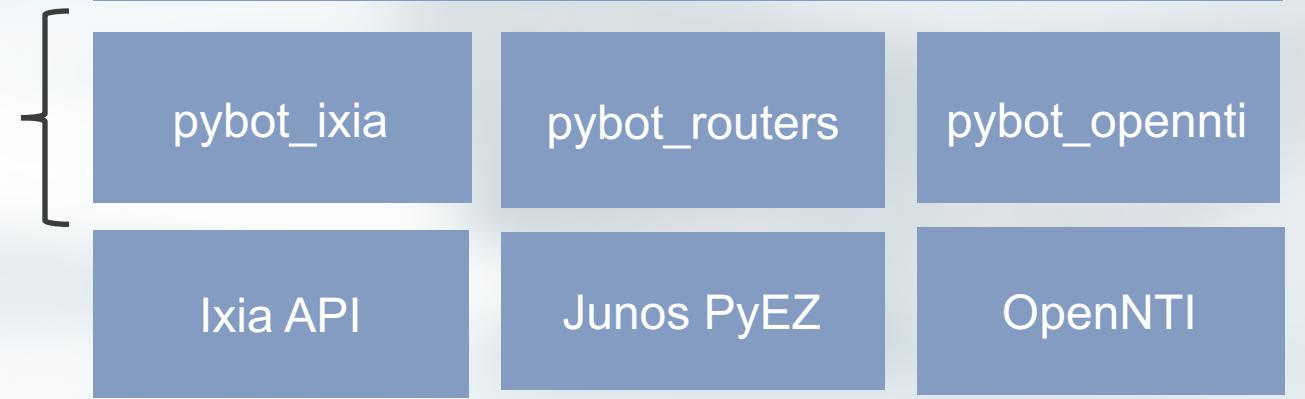
NITA Project Software Stack

It will take from Gitlab the latest test plan and run it, then create a report that ease the

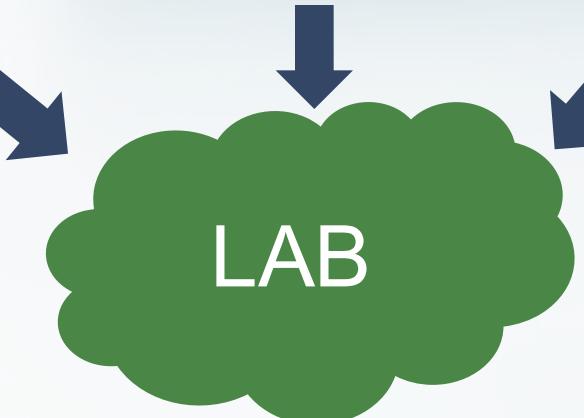


It's imperative to keep track of all changes on templates, test cases, during the project

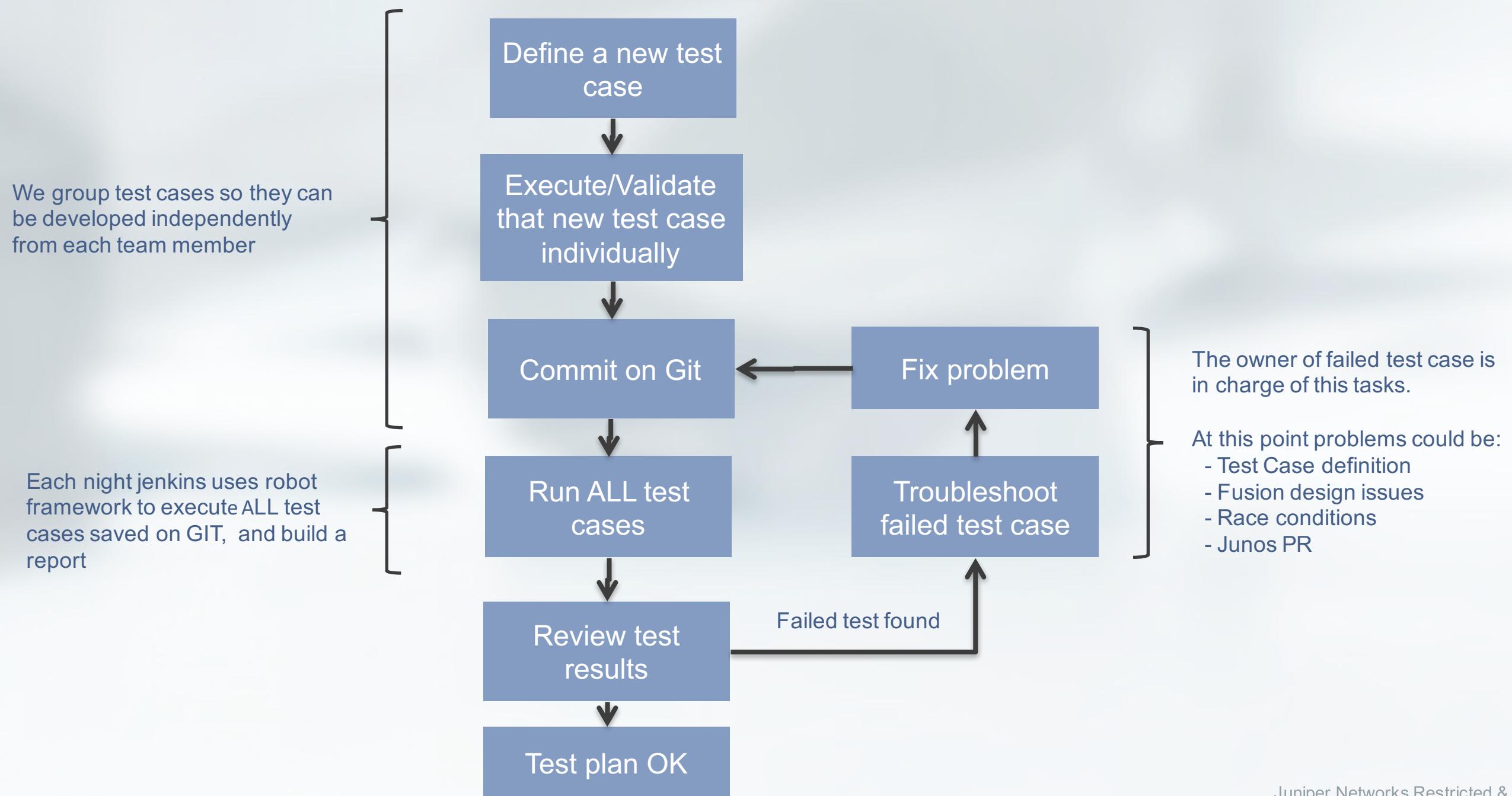
Custom python libraries in order to make interoperable DUT APIs into Robot Framework



OpenNTI help us to understand KPI behavior during the whole test plan



NITA– Continuous testing philosophy



Resources

Additional Resources

<http://github.com/Juniper>

<http://developer.juniper.net>

<http://forums.juniper.net>

<http://pathfinder.juniper.net/feature-explorer/>

<https://learningportal.juniper.net>

On-line Support Community

<http://forums.juniper.net> Select “Junos Automation (Scripting)”

The Juniper “J-Net” Forum is a message board resource monitored by Junos Automation experts.

The screenshot shows a forum page titled "JUNOS AUTOMATION (SCRIPTING)". The top navigation bar includes links for Solutions, Products & Services, Company, Partners, Support, and Education. Below the title, there are buttons for "New Message" and "Board Options". A search bar is present above the list of posts. The main content area displays a list of forum topics with columns for Subject, Replies, Author, Views, and Latest Post. Topics include "TERMS AND CONDITIONS", "What is Junos Automation?", "How do I jump start on Junos automation?", "Explain enable-primary-nexthop script", "Script for DDNS?", "Writing to files from an op script", "Script Automation on SRX : Executed by the seconda...", "Re: JUNOSCRIPT: Evaluate only proposed changes in ...", "Centralized scripts and copying to both routing-en...", "What tools do you use to develop Junos automation ...", and "slax vs. xsit ?". On the right side, there is a "Login to Community" panel with fields for User ID and Password, and a "Login" button. Below it are links for "Forgot your Password?", "Register", and "Help". A "Junos Automation Quick Links" section contains links to the Script Library, Release Highlights, Day One Booklets, Connect Video Show, IOS-to-Junos Software Translator, Technical Documentation, and Platform. The bottom right corner features an "Announcements" section with links to New to Community?, Configuration Library - Win an iPad!, and New KB Servers are now live!

Subject	Replies	Author	Views	Latest Post
TERMS AND CONDITIONS	0	roy_lee	603	08-10-2010 06:34 PM by roy_lee
What is Junos Automation?	0	roy_lee	785	08-10-2010 06:32 PM by roy_lee
How do I jump start on Junos automation?	0	roy_lee	794	08-11-2010 10:14 AM by roy_lee
Explain enable-primary-nexthop script	9	vahag84	1884	10-07-2010 02:24 PM by jzaidman
Script for DDNS?	0	jzaidman	124	10-06-2010 07:49 PM by jzaidman
Writing to files from an op script	2	aweck	659	10-06-2010 12:07 PM by aweck
Script Automation on SRX : Executed by the seconda...	3	nicolas@karp.fr	792	09-30-2010 07:46 AM by ccall
Re: JUNOSCRIPT: Evaluate only proposed changes in ...	16	Mattia	2339	09-22-2010 01:58 PM by JoshTX
[1 2]				
Centralized scripts and copying to both routing-en...	5	BuckWeet	1601	09-10-2010 07:18 AM by ccall
What tools do you use to develop Junos automation ...	1	roy_lee	872	09-09-2010 02:00 PM by jschulman
slax vs. xsit ?	2	roy_lee	1423	08-26-2010 04:51 AM by jschulman

Video Training

<https://learningportal.juniper.net>

The screenshot shows a video player interface for a Juniper Networks video. At the top left is the Juniper Networks logo. To its right is the title "Junos as a Scripting Language". Below the title is a breadcrumb navigation bar showing "INTRODUCTION > Introduction". On the far right are "FEEDBACK" and "EXIT" buttons. The main content area features a large, stylized blue geometric background with white text in the center that reads "Welcome to Junos as a Scripting Language". At the bottom of the screen is a navigation bar with "Previous" and "Next" buttons, along with a play button icon. A copyright notice at the very bottom states "Copyright © 2010, Juniper Networks, Inc. All Rights Reserved".

JUNIPER NETWORKS

Junos as a Scripting Language

INTRODUCTION > Introduction

FEEDBACK EXIT

CONTENTS

- 1 INTRODUCTION
 - > Introduction
- 2 JUNOS SCRIPT AUTOMATION FUNDAMENTALS
- 3 XML
- 4 XSLT
- 5 SLAX
- 6 JUNOS FUNCTION LIBRARY
- 7 COMMIT SCRIPTS
- 8 OP SCRIPTS
- 9 EVENT SCRIPTS
- 10 RESOURCES/CONCLUSION

Welcome to Junos as a Scripting Language

Previous ▶|◀|▶ Next

Copyright © 2010, Juniper Networks, Inc. All Rights Reserved

Automation Lab Setup

