Devops/Netops FSO Training Lab – API Programmability

## Intro

Enterprise/Business Value – Deploying all Infrastructure Config via code, guarantees your Business Continuity, reliability, and stability of your organizations’ bread and butter applications while allowing a vast savings due to achieving economies of scale and doing more with less via automation. A “new way of working” for Network Administrators – which utilizes Devops methodologies, cannot be learned in a Power Point but is rather a ‘hands on skill’ that can only be learned via ‘hands on learning and repetition’ of tasks, similar to the process of learning how to play a musical instrument.

A violinist cannot become good at playing the violin by watching a power point. They need hands on ‘real skills’ training and repetition of scales to improve their skill. Learning new skills that eventually become a ‘craft’ is painful and uncomfortable. So is this lab. This lab ‘disrupts’ the traditional way of working using manual config, and or config management – to using automation pipelining and Devops rapid iteration methodologies. Mentally, this is a giant cognitive leap for most Network Engineers.

This lab is not a power point experience. This lab is a hands-on skill developing experience which will require students to actively be editing, creating code as they work through the lab in order to make the ‘thought’ to ‘action’ neural pathway development required for acquiring a new skill. Active participation and repetition are required to acquire the skills required and ‘re-train’ the brain in new habits and ways of working. The mind always wants to revert to doing what has had success in doing for many years. Henceforth, it is very challenging for Network Admins to adopt a new way of working when they have spent years developing and perfecting their land-based networking workflow and craft. To ‘re-train’ the brain requires hands on practice and repetition. This lab endeavors to create new neural synaptic connections in the Network Administrator’s brain to allow them to adopt a new way of working in a hybrid cloud environment using automation, code, and APIs. This lab has no opportunity for the fall back to the manual work flow ‘safety-net.’

Students of the lab will learn how to use the FSO stack APIs, I will also learn a new ‘way of working’ which is the Devops/Netops work-flow methodology that uses the ‘RAD SDLC’.

A ‘new way’ of working is required in the hybrid cloud environment which is dramatically different from the ‘traditional data center way of working’ that Network Admins have been following for the past 30 years. 12 years ago, System Administrators evolved over time into Devops Engineers. The emergence of virtualization and cloud technologies required the traditional Systems Admins to learn coding and automation skills and adopt new tool sets. Devops has evolved to be the bridge between Development and Operations. Several Devops Engineers can fully manage and automate entire enterprise operations for hundreds of applications across global companies, whereas in the past, this may have required dozens of Systems Engineers.

As the network layer extends into the cloud, Network Administrators are having to rapidly adapt to adopting a new way of working to ensure success of new network architectures in hybrid environments. The traditional ‘data center’ or land-based network architectural methodologies do not work in cloud environments and if applied can cause disastrous results. Hence-force this lab endeavors to teach and “fast-track” the traditional “Network Admin” who may be an expert in switch, router, and land-based (terrestrial) network architecture – to experiencing a ‘bran new’ way of working which is in the sphere of “Devops” to enable them to build success via automating infrastructure as code in their new hybrid environments. The other result of adopting this new way of working results in dramatic cost savings for enterprises as well as a vastly higher level of business continuity.

The Goal of a Devops Engineer: Anything that will ever need to be done more than once needs to be automated. All automation needs to happen securely with the ability to ‘back-rev’ instantly on the fly without impacting business continuity. In an ideal Devops World, the entire infrastructure including the network will be deployed as Code in an automated Pipeline whereby the Pipeline produced infrastructure can be assigned a release version and updated on the fly or continuously without impacting the overlay application environment. Does this sound like a lofty goal? It is not. Many large Enterprises and Up and Coming Start-ups have already successfully accomplished this task. These companies, will outpace their competition in the coming years and will be able to scale, develop, and adopt new better technologies faster and spend less money than the competition who does not.

## How is this lab different from other Cisco Labs?

To date Cisco labs are hosted in a cisco environment and consist of almost all cisco products that are pre-deployed and configured. This lab can be deployed directly into the Customer environment 100% from code at a low cost of approximately $1 per day per lab student. Therefore, the customer instantly has a lab, with plug and play architecture they can ‘plug in’ any of their existing applications to test with the Cisco Products at a very low cost on demand when they require – and immediately have a framework in place to start developing their own code and solutions via this lab in their own environment.

To date, most cisco labs consist of almost 100% cisco solutions. However, Customer sites do not only consist of cisco solutions, they also consist of tens, hundreds, sometimes thousands of different applications. This lab allows customers to integrate in their own environment their own existing technologies for which they have invested many years, time and money directly into this lab in an easy, plug and play methodology via the Pipeline integration.

Once the lab infrastructure is deployed into the customer test environment, they can easily, and quickly ‘plug in’ all and any of their applications and infrastructure into this lab pipeline to test out various integrations.

The lab pipeline once deployed into the customer site, immediately enables that customer to start developing rapidly their own software solutions and integrations by providing them with a free automation pipeline for developing their own code to Cisco APIs.

## As a Student in the lab I will learn the following concepts and perform hands on configuration to acquire a new skill as follows:

### “How to” via automation:

* Automatically and securely bulk deploy and configure via API accessible objects and features of the FSO stack APIs.
* Rapidly iterate and build code using python that automate bulk operations standard devops work that utilizes cisco APIs
* Start developing my own code immediately to develop my solution ideas and integrations to the Cisco APIs to build my own products I can sell for re-occurring revenue and deploy the framework to rapidly develop my solution based on product feedback by using the code build pipeline with the Cisco FSO APIs.
* Deploy entirely via code, my Cloud Provider(AWS) lab environment using a Devops non-opinionated Pipeline which utilizes ephemeral build containers to achieve economies of scale in the cloud and maintain infrastructure operations at minimal cost by using ephermal build containers.
* Integrate the automation pipeline with: Hashicorp Vault, container repositories(ie) docker, source code repo(git), artifactory, Kubernetes, AWS API, in order to automatically integrate external third party resources and applications into the build pipeline for our entire infrastructure as code – where we will deploy the FSO stack to monitor, alert, and optimize or infrastructure in an automated manner via the code build pipeline
* Integrate Hashicorp Vault to securely authenticate and authorize access to my FSOs API by securely passing in all variables, parameters, API keys, etc into my code via the Vault so that there are no hard coded or exposed API keys, passwords, or variables, parameters exposed in my code, and have this automated in the pipeline so we can easily rotate any vars, params, passwords, API keys with zero impact to our underlying applications.
* Demonstrate how to iterate on our infrastructure release without impacting our overlay applications in a safe, secure, automated manner using automation tasks which utilize our pipeline infastructure and allow for rapid iteration.
* Learn and understand the value of the use of ‘ephemeral build containers’ to build our code consistently and securely instead of doing local code builds or using virtual local environments to ensure all our development happens on identical build containers and that we can instantly update, test, and ensure any changes to our build containers do not negatively impact the overlay apps. Most applications and infrastructure outages are caused by inconstant development (local development). This is very different from how Cisco labs are currently executed traditionally. Traditionally, Cisco labs have the students using a virtual environment to install all python modules locally as well as other dependencies. This is a recipe for disaster however in enterprise environments if used to develop and test code in enterprises.
* Traditionally, Cisco labs for APIS have been conducted using Postman, where all API keys, passwords, variables are loaded in clear test which does not adhere to security standards and if employed by Customers at their site, can lead to security exploits. Therefore, this lab endeavors to teach students how to securely handle all passwords, API keys etc. using a vault integrated with their build pipeline.
* Demonstrate the value of using Devops development methodology to speed up, improve stability, and ensure business continuity and improve the quality and testing of our entire infrastructure as well as our Cisco FSO and other business applications via ‘Rapid Iteration’ techniques.
* Manage my Cloud Provider(AWS) auth securely using a vault (Hashicorp Vault)
* Integrate my vault to my code build pipeline(Hashicorp Vault/Concourse)
* Maintain all my network config for my routers, switches, other Cisco Devices in a code repo(git)
* How to integrate my build pipeline with my code repo in order to ensure that all and any configuration that exist in my environment can be deleted and duplicated simply via code deployment (eradicate all any manual configuration).