Automation & Orchestration
F5 Automation Toolchain

Presented by:
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Agenda

- Introduction
- Challenges in DoD
- F5 Automation Toolchain
  - Declarative Onboarding (DO)
  - Application Services 3 Extension (AS3)
  - Telemetry Streaming (TS)
- Ecosystem Integrations
- Demo
Software is a Critical Component of the DoD mission

- Need for updating software rapidly (agile)
  - ...in a secure fashion
  - ...knowing things won’t break
- Need to establish Secure Application Development Capabilities
- Bake-in & enforce cybersecurity from inception through operations
- Enhance enterprise visibility
Challenges in DoD

- Lack of test automation
- Legacy Systems
- App Complexity
- Tool Sprawl

- Managing Environments (disconnected, classified, etc…)
- Skillset / Self-service training
- Culture
Cloud Templates
Configure and deploy F5 BIG-IP VEs into public and private clouds.

Declarative Onboarding
Provision initial configuration of BIG-IP devices through a declarative API.

Application Services 3 Extension
Configuration of L4-L7 via declarative APIs.

Telemetry Streaming
Stream BIG-IP telemetry for analytics and automation. Telemetry Streaming is an iControl LX extension and will send client/server stats from the BIG-IP via HTTP(S), Statsd or Kafka formats.

Change
Use telemetry data to track health, security and performance of applications. Use thresholds and triggers to scale app services.
Imperative vs Declarative

**Imperative**
- Tell the system **HOW** to do something - every step of the way

**Declarative**
- Tell the system **WHAT** you want, and let it figure out **HOW** to do it

Declarative API - you define the desired end-state – it fills in the details on “how to get there”
Automate Device Onboarding with Declarative Onboarding (DO)

What is it?
- F5 BIG-IP API Extension (Node.js)
- Provides declarative interface for L1-L3 device onboarding
- Deployments via a single REST API endpoint
- JSON-based document

What are the Benefits?
- Minimizes need for BIG-IP domain specific knowledge
- Minimizes onboarding errors
- Maximizes onboarding consistency
- TMOS-independent RPM package
Standalone Declaration – Declarative Onboarding

```json
{
    "schemaVersion": "1.9.0",
    "class": "Device",
    "async": true,
    "label": "Declarative Onboarding Simple Standalone Example",
    "Common": {
        "class": "Tenant",
        "hostname": "bigip01.f5gov.com",
        "myLicense": {
            "class": "License",
            "LicenseType": "regKey",
            "regKey": "RXUUGL-HOTFC-WCICJ-NZGMY-PXZNTQ",
            "overwrite": false
        },
        "myDns": {
            "class": "DNS",
            "nameServers": [
                "8.8.8.8",
                "2001:4860:8600:8844"
            ],
            "search": [
                "f5.com"
            ]
        },
        "myNtp": {
            "class": "NTP",
            "servers": [
                "8.pool.ntp.org",
                "1.pool.ntp.org",
                "2.pool.ntp.org"
            ],
            "timezone": "UTC"
        }
    },
    "guestUser": {
        "class": "User",
        "userType": "regular",
        "password": "mrcpurple123!",
        "partitionAccess": {
            "Common": {
                "role": "guest"
            }
        }
    },
    "anotherUser": {
        "class": "User",
        "userType": "regular",
        "password": "mrcpurple123!",
        "shell": "none",
        "partitionAccess": {
            "all-partitions": {
                "role": "guest"
            }
        }
    },
    "myProvisioning": {
        "class": "Provision",
        "ltm": "nominal",
        "gtm": "nominal",
        "asm": "nominal"
    },
    "internal": {
        "class": "VLAN",
        "tag": 4093,
        "mtu": 1500,
        "interfaces": [
            {
                "name": "1.1",
                "tagged": false
            }
        ]
    },
    "internal-self": {
        "class": "SelfIP",
        "address": "10.1.10.100/24",
        "vlan": "internal",
        "allowService": "default",
        "trafficGroup": "traffic-group-local-only"
    },
    "external": {
        "class": "VLAN",
        "tag": 4094,
        "mtu": 1500,
        "interfaces": [
            {
                "name": "1.2",
                "tagged": false
            }
        ]
    }
}
```
Standalone Declaration via BIG-IQ – Declarative Onboarding

```json
{
  "class": "DO",
  "declaration": {
    "schemaVersion": "1.5.0",
    "class": "Device",
    "async": true,
    "Common": {
      "class": "Tenant",
      "hostname": "bigip01.f5gov.com",
      "myLicense": {
        "class": "License",
        "licensePool": "demo-licenses",
        "licenseType": "licensePool",
        "bigIpUsername": "admin",
        "bigIpPassword": "{{bigippassword}}"
      },
      "myProvisioning": {
        "class": "Provision",
        "ltm": "nominal",
        "gtm": "minimum",
        "afm": "nominal",
        "asm": "nominal"
      },
    },
    "myDns": {
      "class": "DNS",
      "nameServers": [
        "8.8.8.8",
        "2001:4860:4860::8844"
      ],
      "search": [
        "f5.com"
      ],
    },
    "myNtp": {
      "class": "NTP",
      "servers": [
        "0.pool.ntp.org",
        "1.pool.ntp.org",
        "2.pool.ntp.org"
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      "timezone": "UTC"
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    "external": {
      "class": "VLAN",
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        "name": "1.1",
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      ],
    },
    "internal": {
      "class": "VLAN",
      "interfaces": [
        "name": "1.2",
        "tagged": false
      ],
    },
    "external-floating": {
      "vlan": "external",
      "class": "SelfIP",
      "address": "10.1.10.240/24",
      "trafficGroup": "traffic-group-1"
    },
    "internal-floating": {
      "vlan": "internal",
      "class": "SelfIP",
      "address": "10.1.20.240/24",
      "trafficGroup": "traffic-group-1"
    },
    "external-self": {
      "vlan": "external",
      "class": "SelfIP",
      "address": "10.1.10.241/24",
      "allowService": "none"
    },
    "internal-self": {
      "vlan": "internal",
      "class": "SelfIP",
      "address": "10.1.20.241/24"
    },
    "default": {
      "gw": "10.1.10.1",
      "class": "Route"
    },
    "targetUsername": "admin",
    "targetHost": "10.1.1.8",
    "targetPort": 443,
    "targetPassphrase": "{{bigippassword}}"
  }
}
```
Automate Application Deployments with AS3

- Application Services 3 Extension – BIG-IP API extension that accepts a declarative API call
- Configures BIG-IP L4-7 services
- Minimizes need for BIG-IP domain specific knowledge
- Minimizes deployment errors
- Makes it easy to integrate F5 automation into orchestration systems
- Runs on BIG-IP & BIG-IQ
- Create application dashboards for monitoring & alerts when used with BIG-IQ
HTTP Example Declaration – AS3

```json
{
   "class": "AS3",
   "action": "deploy",
   "persist": true,
   "declaration": {
      "class": "ADC",
      "schemaVersion": "3.7.0",
      "id": "http-example-declaration",
      "label": "Task1",
      "remark": "Task 1 - HTTP Application Service",
      "http_tenant": {
         "class": "Tenant",
         "http_app_1": {
            "class": "Application",
            "template": "generic",
            "http_vs_1": {
               "class": "Service_Generic",
               "virtualPort": 80,
               "virtualAddresses": [
                  "10.1.10.111"
               ],
               "pool": "http_pool",
               "profileHTTP": {
                  "use": "http"
               },
               "http_pool": {
                  "class": "Pool",
                  "monitors": [
                     "tcp"
                  ],
                  "members": [
                     {
                        "servicePort": 80,
                        "serverAddresses": [
                           "10.1.20.110",
                           "10.1.20.111"
                        ]
                     }
                  ]
               }
            }
         }
      }
   }
}
```
Deleting Configuration Objects with AS3

```json
{
    "class": "AS3",
    "action": "deploy",
    "declaration": {
        "class": "ADC",
        "schemaVersion": "3.12.0",
        "waf_https": {
            "class": "Tenant"
        },
        "http_tenant": {
            "class": "Tenant"
        }
    }
}
```
Real-Time Analytics with Telemetry Streaming

- Provides stats on: Device, LTM, tenants and apps, TLS Cert Inventory, and event log (all sources)
- Declarative
- Streams from BIG-IP to a data store
- Validated 3rd party consumers: Splunk, Azure Log Analytics, AWS CloudWatch, AWS S3, Graphite, ElasticSearch and more
AWS CloudWatch Example Declaration – Telemetry Streaming

```json
"class": "Telemetry",
"My_System": {
    "class": "Telemetry_System",
    "systemPoller": {
        "interval": 60
    }
},
"My_Listener": {
    "class": "Telemetry_Listener",
    "port": 6514
},
"My_Consumer": {
    "class": "Telemetry_Consumer",
    "type": "AWS_CloudWatch",
    "region": "us-east-1",
    "logGroup": "test_group",
    "logStream": "automation_demo",
    "username": "{{AWS_ACCESS_KEY}}",
    "passphrase": {
        "cipherText": "{{AWS_SECRET_KEY}}"
    }
}
```
Automation Orchestration Toolchain Benefits

- Minimizes
  - Need for BIG-IP domain specific knowledge
  - Onboarding errors & deployment errors
- Maximizes
  - Onboarding & deployment consistency
  - Reusability
- Easy Integration
  - Enables developers to extend F5 app services & integrate with CI/CD toolchains, orchestration systems & 3rd-party ecosystems
- Helps drive an organizations’ adoption of Infrastructure as Code (IaC) & DevOps
Ecosystem Integrations

kubernetes  vmware  servicenow  aws  CloudWatch

F5 Ansible Modules

Amazon S3

Terraform

OPENSHIFT

Azure

Google Cloud

Azure Log Analytics

CISCO  GitLab  openstack  GitHub  splunk  graphite
Automate BIG-IP with Ansible

Simple
- Agentless solution: No new software to install on BIG-IP
- Use Ansible to license a BIG-IP for application deployment

Powerful
- Ansible integrates to make use of the native APIs of BIG-IP
- Ansible F5 modules follow best practice and enable compliance

Automated
- Automate the initial configurations on BIG-IP and deploy HTTP(S) apps
- Automate to Network the BIG-IP (VLANS, Self-IPs)

Full library of F5 modules on Ansible.com
F5 Ansible BIG-IP Modules Now Available (Release 2.9.x)

170+ F5 Modules
Conclusion

• Software is a Critical Component of every aspect of the DoD mission
• Challenges in DoD
• F5 Automation Toolchain
  • DO, AS3, TS
• Ecosystem Integrations
  • Ansible F5 Modules
• F5 Automation Toolchain + Ansible Demo
  • Near real-time insights w/ Telemetry Streaming
  • Grafana Dashboard (visualization tool)
Getting Started Resources

• Declarative Onboarding (DO)
  • https://clouddocs.f5.com/products/extensions/f5-declarative-onboarding/latest/

• Application Services Extension (AS3)
  • https://clouddocs.f5.com/products/extensions/f5-appsvcs-extension/latest/

• Telemetry Streaming (TS)
  • https://clouddocs.f5.com/products/extensions/f5-telemetry-streaming/latest/

• F5 Ansible Modules & Integration
  • https://clouddocs.f5.com/products/orchestration/ansible/devel/

• BIG-IQ API
  • https://clouddocs.f5.com/products/big-iq/mgmt-api/v7.0.0/

• F5 Container Connector (OpenShift)
  • https://clouddocs.f5.com/containers/v2/openshift/

• F5 Container Ingress Services (Kubernetes)
  • https://clouddocs.f5.com/containers/v2/kubernetes/

• General Cloud Docs
  • https://clouddocs.f5.com/
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