Programmability 101 - Introduction to BIG-IP REST Structure and Concepts

Presented By:
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In this lab we will...

- Review Automation & Orchestration Concepts
- Learn Basics of REST
- Module 1: Imperative Automation via the BIG-IP REST API
- Explore Declarative APIs and AS3
- Module 2: Abstracting Services using the App Services 3 Extension

Elevate your knowledge of automation basics so you can support and drive modern workflows in your organization
Automation & Orchestration Concepts
Automation and Orchestration

• Automation is about codifying tasks.
• Orchestration is about codifying processes.
• Orchestration takes advantage of automation by reusing these basic building blocks.
Why Organizations Use Automation Frameworks

- **REDUCE OPEX**
  - $

- **SCALING TO MEET DEMAND**

- **TIME TO MARKET**
Automation makes your life easy!

- Use it!
- Saves a valuable resource—*time*—allowing you to focus on more important tasks!
Understanding imperative vs. declarative

**Imperative** – What we’ve done for years (scripting, iRules, etc.) Imperative methodology implies that you define the flow of an operation implicitly. It also implies that domain-specific knowledge is required to interact with the system.
Understanding imperative vs. declarative

**Declarative** – What we’re evolving to. Declarative methodology implies that you define the desired outcome and depend on underlying mechanisms to deliver that outcome. This methodology tries to reduce or eliminate the need for domain specific knowledge.
Concepts – Source of Truth(iness)

• Source of Truth: A system or object that contains the authoritative representation of a service.

• GitHub repositories are an example of a Source-of-Truthiness.

• To address real-world challenges we prefer to call this ‘Source-of-Truth(iness)’.

• Changes for a service should propagate (push) from the source of truth to subordinate systems.
  • Out-of-band changes must be handled very carefully (or be totally avoided).
Introduction to REST
Introduction to REST

• Based on HTTP and JSON

• Uses HTTP methods (GET, POST, PUT, PATCH, DELETE)

• Data is sent using the Javascript Object Notation format

```json
{
  "attribute1":"value1",
  "attribute2": ["array","of","values"],
  "attribute3": [ { "nested1":"value1", "nested2":"value2" }, {"nested3":"value3"} ]
}
```
REST APIs and HTTP Verbs

- **What action do I want to perform?**

- HTTP methods (verbs) are used to create, read, update, and delete (CRUD) resources

- APIs must use HTTP verbs in a manner described in the table below

<table>
<thead>
<tr>
<th>URI</th>
<th>POST</th>
<th>GET</th>
<th>PUT</th>
<th>DELETE</th>
<th>PATCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection</td>
<td>Create resources.</td>
<td>Get representation of all resources in the collection.</td>
<td>Fully update all resources in a collection.</td>
<td>Delete all resources in a collection.</td>
<td>Partially update all resources in a collection.</td>
</tr>
<tr>
<td>Resource</td>
<td>Used for non-idempotent controller resources.</td>
<td>Get a resource's representation.</td>
<td>Fully update the resource if it exists.</td>
<td>Delete a resource.</td>
<td>Partially update a resource.</td>
</tr>
</tbody>
</table>
Anatomy of a REST URI

https://192.168.1.1/mgmt/tm/ltm/pool/~Common~mypool/members/~Common~m1:80

Root  Organizing Collection(s)  Collection  Resource  Sub-Collection  Sub-Collection Resource

NOTE: Resource names map ‘~’ to ‘/’ (e.g. ~Common~mypool is really /Common/mypool)
Response Codes

- **What was the result of my action?**
- APIs must make use of HTTP response codes where appropriate
- The following table describes the required success response codes

<table>
<thead>
<tr>
<th>Response Code</th>
<th>Applicable Verbs</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 OK</td>
<td>• All</td>
<td>Return on most positive responses including DELETE.</td>
</tr>
<tr>
<td>201 Created</td>
<td>• POST</td>
<td>HTTP Location header contains link to newly created resource.</td>
</tr>
<tr>
<td>202 Accepted</td>
<td>• POST, PUT, PATCH, DELETE</td>
<td>Return when a request will take a long time; server should return a Location header for client to get state updates.</td>
</tr>
<tr>
<td>404</td>
<td>• GET</td>
<td>The resource does not exist.</td>
</tr>
<tr>
<td>500</td>
<td>• All</td>
<td>Check /var/log/restjavad.0.log</td>
</tr>
</tbody>
</table>
How the REST API is Implemented on TMOS

REST API attributes are derived from TMSH schema.

Generally, if the attribute-option is available in TMSH it’s available in REST.

```
list ltm pool pool1 members {10.1.20.1:80}
```

GET: https://10.1.1.245/mgmt/tm/ltm/pool/pool1/members/~Common~10.1.20.1:80
Got it? Now let’s…

LET'S AUTOMATE

ALL THE THINGS

makeameme.org
UDF Status
Module 1
Imperative Automation via the BIG-IP REST API

1.1: Exploring the iControl REST API
1.2: REST API Authentication & example Templates
1.3: Review/Set Device Settings
1.4: Basic Network Connectivity
1.5: Build a BIG-IP Cluster using a Collection
1.6: Build a Basic LTM Config using REST Transactions
Imperative Automation via the BIG-IP REST API
AS3 - Declarative API
F5 Automation Toolchain

Bootstrap
- CLOUD TEMPLATES
  - Start BIG-IP Instances in Public & Private Clouds

Onboard
- DECLARATIVE ONBOARDING EXTENSION
  - Initial Config of BIG-IP Instances

Deploy App Services
- APP SERVICES 3 EXTENSION
  - Deploy Classic and Advanced Application Services on BIG-IP using Declarative REST APIs

Monitoring/Telemetry
- TELEMETRY STREAMING EXTENSION
  - Stream Telemetry, Events & Logs from BIG-IP to various Analytics and Logging solutions
Simplify Automation 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, on BIG-IQ or in a container
- Create application dashboards / monitoring / alerts when used with BIG-IQ
Without AS3
Configuring BIG-IP requires many REST API calls

- Requires BIG-IP domain expertise
- Dozens of REST API calls
- Costly to automate and integrate with orchestration systems
- Time-consuming
- Error-prone
With AS3
Configuring BIG-IP requires a SINGLE REST API call

• AS3 abstracts away all BIG-IP configuration complexity
• User only needs to define the desired configuration end-state
• Requires no BIG-IP domain expertise
• Single REST API call simplifies automation and orchestrator integrations
• Accelerates app service deployment
• Declaration is reusable, ensures consistency, reduces errors
AS3 API Endpoint

https://10.1.1.10/mgmt/ shared/appsvecs/declare
Enabling Automation & Orchestration
Module 2
Abstracting Services using the App Services 3 Extension

2.1: Exploring AS3
2.2: Install the AS3 Extension
2.3: Application Service Deployments with AS3
Conclusion
In this lab we…

• Learned the basic concepts required to interact with the BIG-IP iControl REST API

• Walked through a typical Device Onboarding workflow and deployed a fully functional BIG-IP Active/Standby pair

• Deployed an application using the Imperative approach to Automation

• Learned about and deployed an application with F5’s Declarative interface App Services 3 Extension (AS3)

Elevated your knowledge of automation basics so you can support and drive modern workflows in your organization
Thank You
# F5 DoD Virtual Enablement Schedule – Fall Sessions

<table>
<thead>
<tr>
<th>Date</th>
<th>F5 DoD Virtual Enablement Schedule – Q1</th>
<th>Registration Link</th>
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<tbody>
<tr>
<td>Oct 22 - 9-11AM PST</td>
<td>F5 + Ansible - Basic Workshop</td>
<td><a href="https://www.cvent.com/d/y7q361">https://www.cvent.com/d/y7q361</a></td>
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<tr>
<td>Nov 4 - 9-11AM PST</td>
<td>WAF 111: Protecting Against the OWASP Top 10</td>
<td><a href="https://www.cvent.com/d/47qpch">https://www.cvent.com/d/47qpch</a></td>
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<tr>
<td>Nov 18 - 9-11AM PST</td>
<td>WAF 141: Getting Started with WAF, Bot Defense &amp; Threat Campaigns</td>
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<td>Dec 1 - 9-11AM PST</td>
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