Network Automation Workshop

Eric Boyd
Purpose of the Workshop

The purpose of the Network Automation Workshop was to discuss the best practices for US universities and regional networks to automate network operations using orchestration software (e.g. Ansible, Salt) and single source of authority data sets (e.g. NetBox, Git).
Participants

- Duke
- ESNet
- Indiana University / GlobalNOC
- Internet2
- University of Michigan
- University of Minnesota
- Notre Dame
- Penn State
- University of Wisconsin
Shared Problems

- Self Service tools
- Centralized Data
- Source of Truth/Authority
- Consistency
- Reduction of Errors
- Incident Management
- Disaster Recovery
- Topology
- Automated Testing
- Location (In)Dependence
Shared Solutions

- High Availability
- Orchestration
  - Automated config deployments
  - Versioning of config changes
  - Scheduled Roll out with Roll back capability
- Enterprise APIs
  - Integration with existing tools (Infoblox/Bluecat IPAM, Ticketing, CMDB)
  - A clear source of authority for each data type and a central hub where software can make queries
Shared Solutions

● UI Components
  ○ Delegated self-service web tool with standard AAA and RBAC
  ○ Web API for local IT with more extensive needs
● High Quality Software Engineering (testing/review/docs)
● Vendor Agnostic
● Open Source Software
Design Patterns
Recommendations

- Use central source of configuration authority for all devices
- Automation tools should read configuration data from the source of authority and implements changes programmatically
- Use open-source tools where possible
- Use open standards
  - Investigate YANG / OpenConfig
  - OAuth 2.0 for inter-service authentication
University of Michigan and University of Wisconsin are discussing a collaboration to create a tool to delegate limited management of network device configuration to departmental IT staff.

- The goal is to architect this tool to be very modular and to integrate with a variety of supporting components.
  - User management: Shibboleth, LDAP, Grouper, etc.
  - Automation tools: Salt, Ansible, etc.
  - Data sources: Infoblox, NetBox, etc.

Looking to expand this group!
Thanks!

Special thanks to

Mark Tinberg (University of Wisconsin) and Travis Sobeck (University of Minnesota)

for their work to create the workshop summary documents.

https://goo.gl/pGNGhX
Network Connectivity to Cloud Providers
Alok Vimawala
Are you aware of this “cloud” thing?
Who thinks this “cloud” thing will just go away?
Are you aware of this “cloud” thing?
How many cloud providers do you expect to support?
## Multi-cloud is already here

<table>
<thead>
<tr>
<th>Amazon Web Services (AWS)</th>
<th>Google Compute Platform (GCP)</th>
<th>Microsoft Azure</th>
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<tbody>
<tr>
<td>- Canvas</td>
<td>- Gitlab</td>
<td>- Github (soon?)</td>
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<tr>
<td>- Slate</td>
<td>- Unizin Data Platform</td>
<td>- Office 365</td>
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<td>- DUO</td>
<td>- Explorance (Blue)</td>
<td>- Microsoft Intune</td>
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<td>- ArcGIS</td>
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Workshop Purpose

The purpose of the workshop was to discuss of the best methods for US universities to connect to major cloud providers (e.g. Amazon AWS, Microsoft Azure, and Google Cloud) and come up with recommendations and design patterns that may be useful to the research and education community as a whole.
Identify use cases for cloud computing

Identify corresponding (to the use cases) network design patterns

Use those (design patterns) to come up with reference network architectures the Research & Education community can deploy

If possible, include a request to Internet2 and/or regional networks to support certain design patterns
Sharing Current State

- University of Michigan - Alok Vimawala
- Indiana University - Steve Wallace
- Boston University - Gerard Shockley
- University of Minnesota - Travis Sobeck
- Northwestern University - John Walsh
- Duke University - William Brockelsby & Jessica Repka
- Internet2 - Matthew Zekauskas
Identify Use Cases

Burst capacity - extend compute and storage workloads to the cloud

Specialized workloads - workloads that cloud well better suited for

Classes of users / workloads - Research, Enterprise, IoT, Distributed

Extending campus network(s) into public cloud

Security paradigm parity between campus and cloud (hard to do)
Identify Implementation Strategies

- Use your cloud addressing plan - Make one if you don’t have it already
- Different options campus to cloud
  - Direct connect
  - Site to site VPN
  - Commodity / IP connectivity
- Different network designs within cloud providers
  - Spoke/hub - transit VPC
  - VPC proxying
  - VPC peering
Best Practices, Design Patterns, Charge to Internet2 & Regionals

Understand current state of connectivity to cloud providers

Have a cloud connectivity strategy

Settlement free Peering - will give us a bit more influence how they send their traffic to us

Automating site-to-site VPNs between cloud providers and campuses

Determine and deploy campus infrastructure baseline: services needed for cloud to work

Establish a good relationship and communications with the vendor
Next workshop(s):  
Spring 2019 in Minneapolis!  
Sometime between April 1 and June 30, stay tuned...  

Note to Self: Don’t present this slide if Dave Farmer is in audience.