Test your way to a better Deployment!

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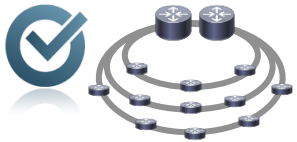
Network Deployment is pretty Straightforward ….

Purchase

Installation (Truck Roll)

Automated NetOps: ZTP, Config Mgmt….

CFEngine puppet labs PalletOps ANSIBLE CHEF SALTSTACK



Service Activation

…maybe a bit of Pre-staging…

Purchase

+

Pre-Staging

Installation
(Truck Roll)

NetOps:
ZTP, Config Mgmt….

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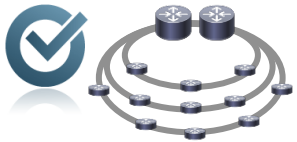

Service
Activation

… A bit of monitoring, some hands-on deck, more truck-rolls when things go south…….

Purchase

+

Pre-Staging

Installation (Truck Roll)

NetOps: ZTP, Config Mgmt….

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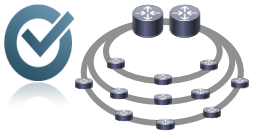
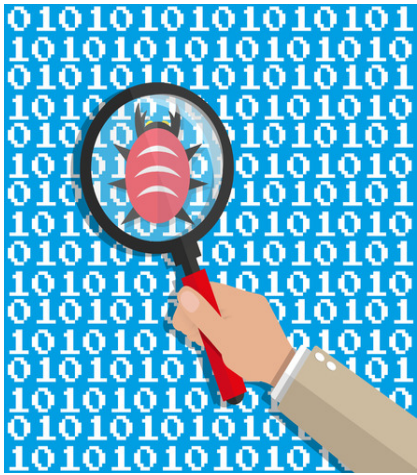


Service Activation

Ok, Network Deployment is complex!

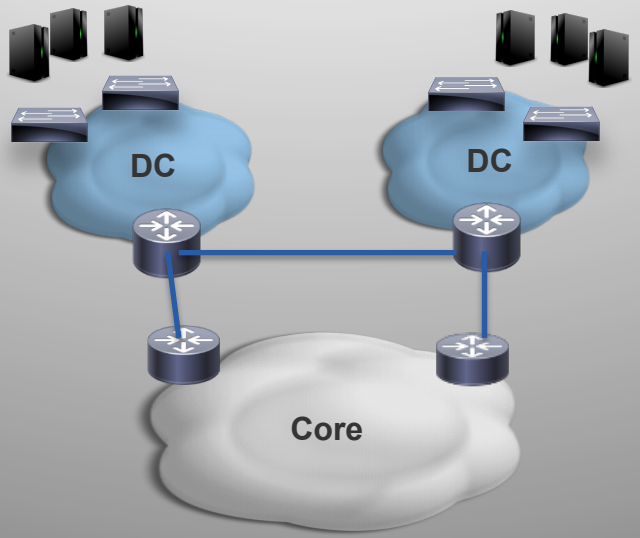
- Hence the need for Validation and Test Cycles.
- These cycles must model real-life deployments and variables.
- Takes time – weeks… mostly months …
- Considerable investment on testing hardware and on good Testers/Developers.



Deconstructing Network Test and Validation

Validation Cycle Requirements

Representative Test Environments



Exhaustive Automated Tests

- Cover Test Topographies / Scenarios
- Actions:
  - Functional
  - Negative
- Validations

Time and Cost Constraints

Time:

Reduce months to weeks

Cost:

- **Reduce man-hour investment**
- **Reduce CAP-EX on Test hardware**

The problems at hand…

- Vendor network protocol implementations are **notoriously difficult to test**
- **Custom Vendor** specific **APIs**
- **Lack of Models:** No consensus on outputs/responses and capabilities
- **Non-overlapping tool coverage :** Ansible coming close to multi-vendor support but no other alternative.
- Cannot commit to one tool over the other. **Test Frameworks need to be modular.**

Creating an open-source Test Framework:

Our Journey

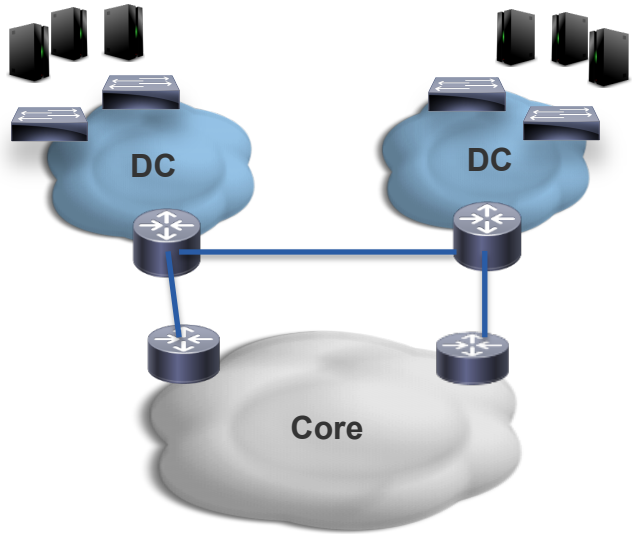
The 5 Commandments:

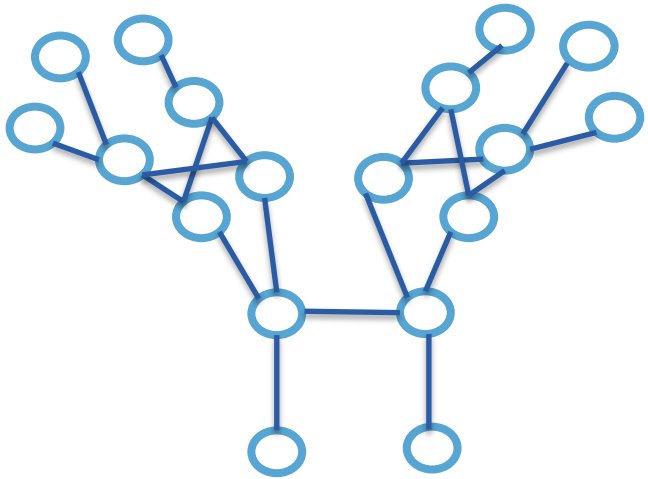
- Workflow and Tool selection should never be bound by architectures. **Be Flexible.**
- **Keep the stack modular and composable**.
- **Re-use existing industry tools** – Do NOT start from scratch unless there is a gap.
- **Create a community** to share test cases and extend libraries.
- **Stand on the shoulders of giants:** Leverage work already done by communities like opendaylight, fd.io etc.

Creating one piece at a time…

Topologies

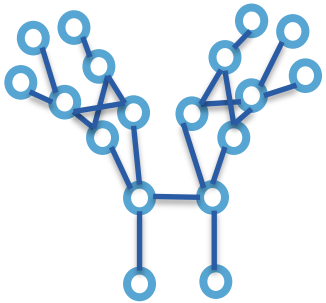
A network is just an undirected graph. Nodes and Edges with certain properties that form the connections.





Topologies

Define a schema, put it in YAML or JSON and run kwalify tests to verify the input is valid.



Schema

```
schema;topology_metadata_map:
  type: map
  mapping:
    version:
      type: any
    schema:


....

schema;type_interfaces:
  type: map
  mapping: &type_interface_mapping
    regex;(port\d+): &type_interface_mapping_port
      type: map
      mapping:
&type_interface_mapping_port_mapping
        name:
          type: str
.....
```

kwalify

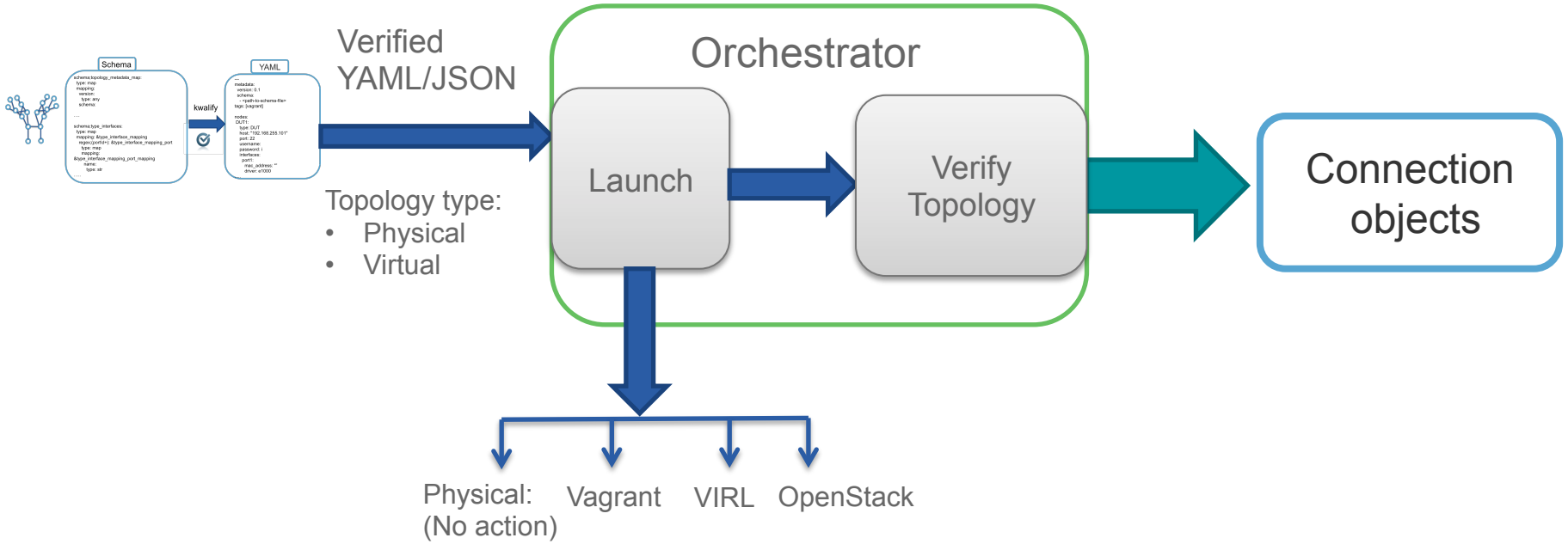
YAML

```
---
metadata:
  version: 0.1
  schema:
    - <path-to-schema-file>
tags: [vagrant]

nodes:
 DUT1:
    type: DUT
    host: "192.168.255.101"
    port: 22
    username:
    password: i
    interfaces:
      port1:
        mac_address: ""
        driver: e1000
.....
```

The orchestrator

- Parse the topology, launch(if needed), verify and return connection objects.
- The orchestrator could be Jenkins, Ansible, test-kitchen or something similar.



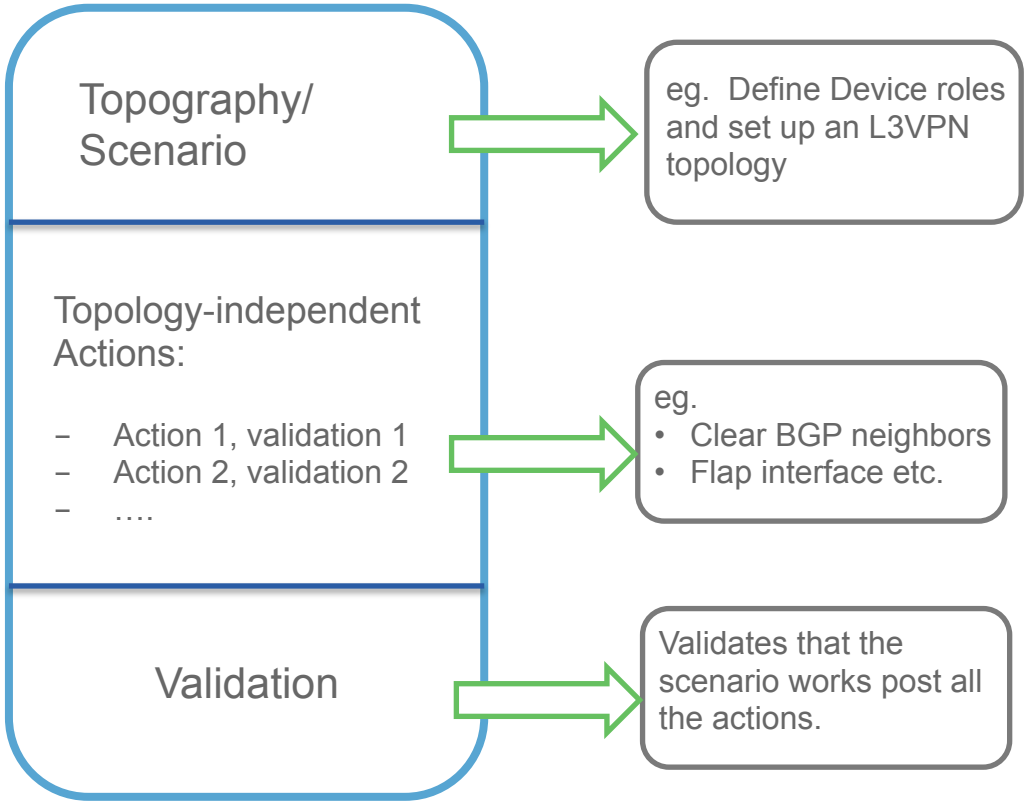
The Test framework

- Dozens of tools available – BDD, Data Driven Test , Keyword Driven Test, etc.

Cucumber

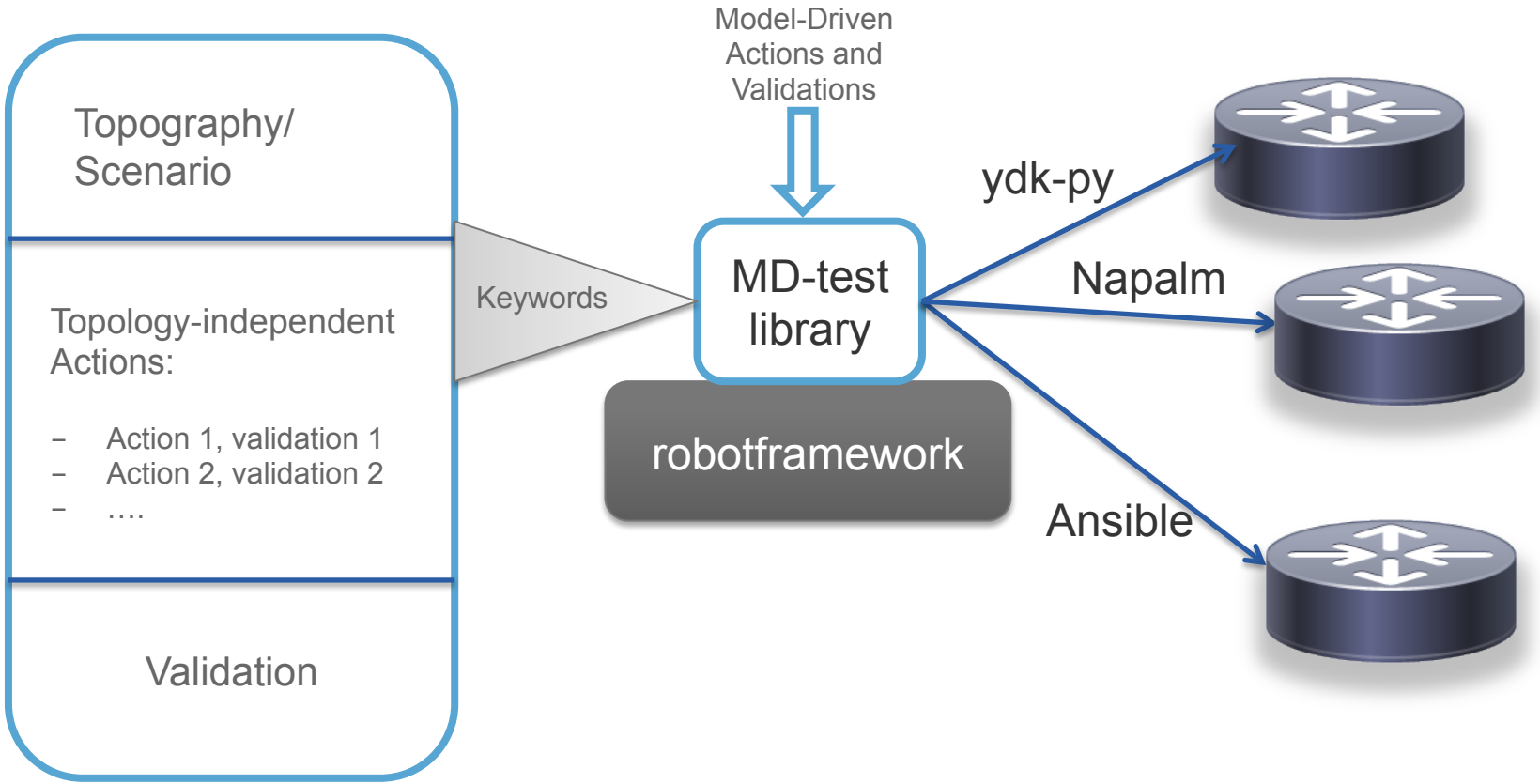
- We wanted our test cases to be inherently shareable.
- So we made a bold assertion: **Test cases should not be written in code.**
- Keyword driven Tests won and we chose http://robotframework.org/

The Test Suite Structure



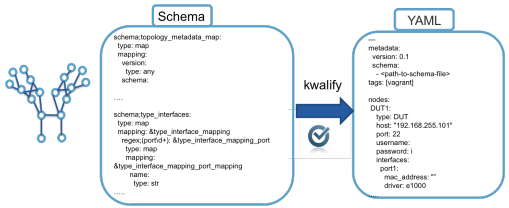
- Topography/Scenario is topology dependent.
- The entire test suite is written only using keywords.
- Keywords are exposed by the Robot-framework Libraries.
- These test cases can be shared with the community

The Test libraries – Model Driven



Bringing it all together

Testers



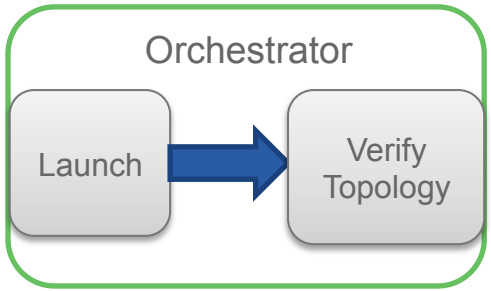
Topography/Scenario

Topology-independent Actions:

- Action 1, validation 1
- Action 2, validation 2
- ….

Validation

Framework Developers



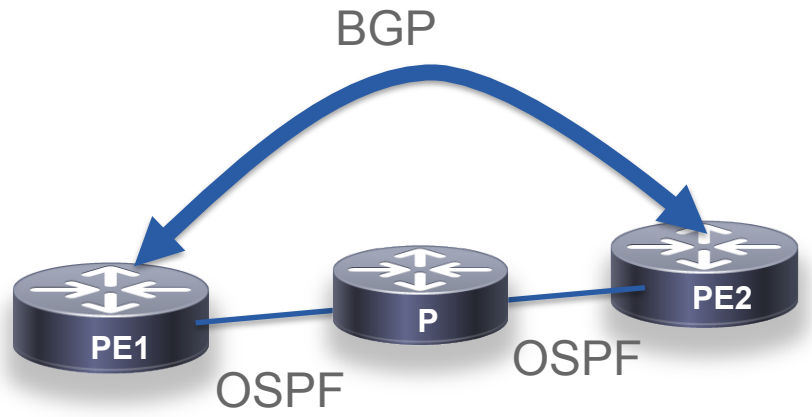
MD-test library

robotframework

DUT/SUT

Demo!

Shareable BGP Tests written using robotframework.



Check us out on Github!

- Robo-YDK organization: https://github.com/roboydk
- Robotframework YDK library: https://github.com/roboydk/roboydk
- Ansible-Topology Orchestration: https://github.com/roboydk/orchestrator
- Packet Injection based topology verification: https://github.com/roboydk/topo-verify

Thank you!