Network Automation and Verification with API-Driven Infrastructure

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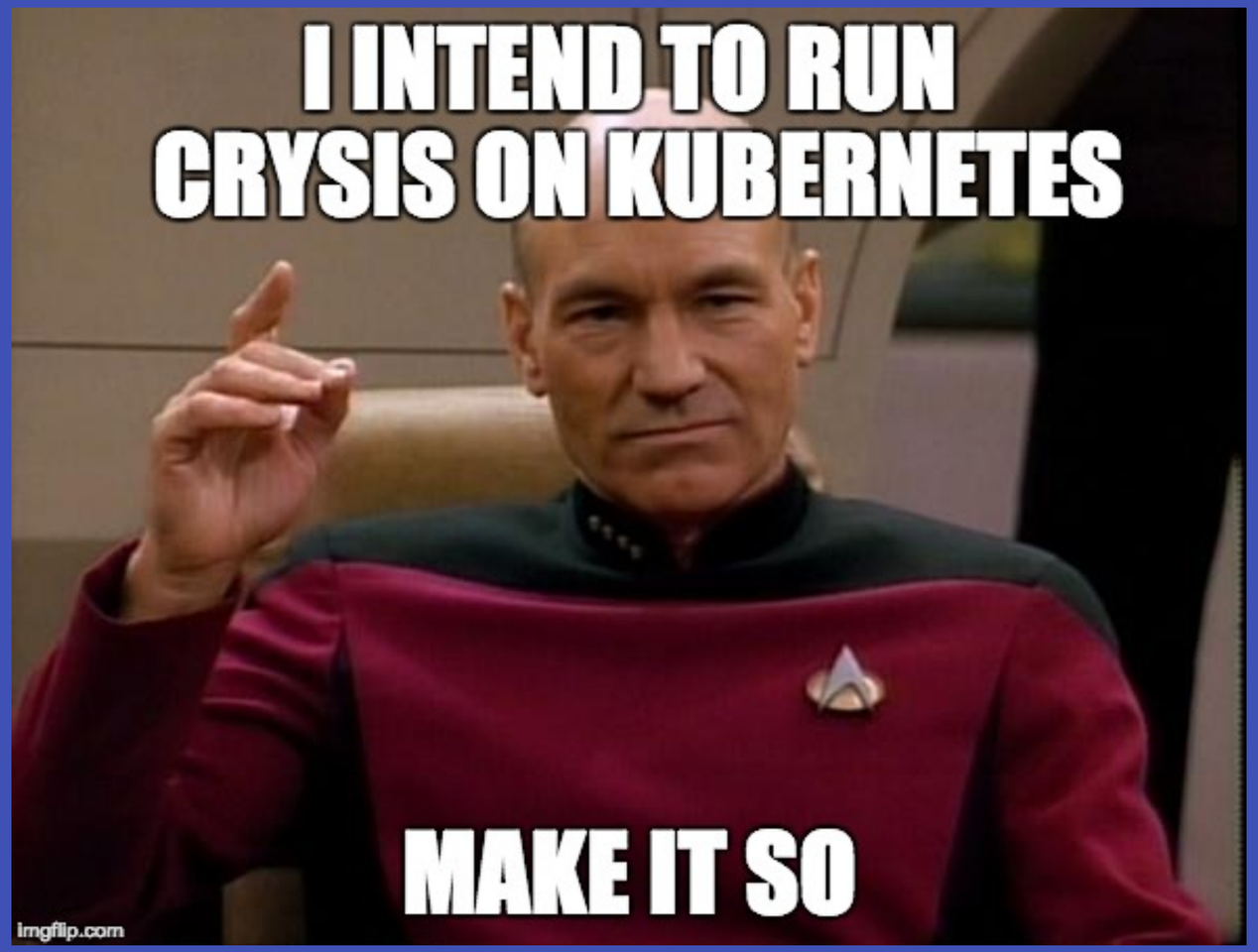
@Mierdin

keepingitclassless.net

In-Tent Driven Networking

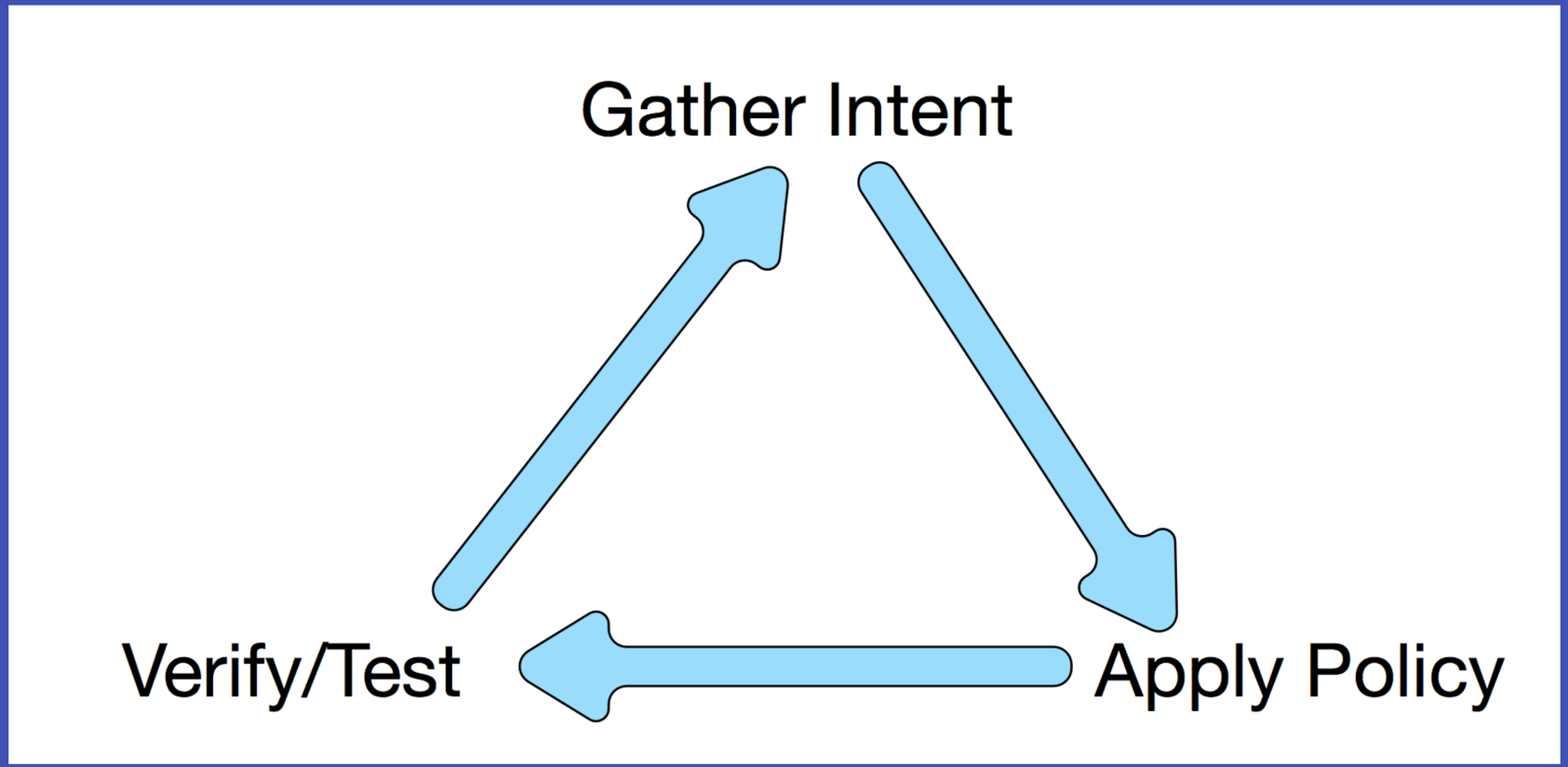
Proactively Seeking Out Intent



Proactively Seeking Out Intent

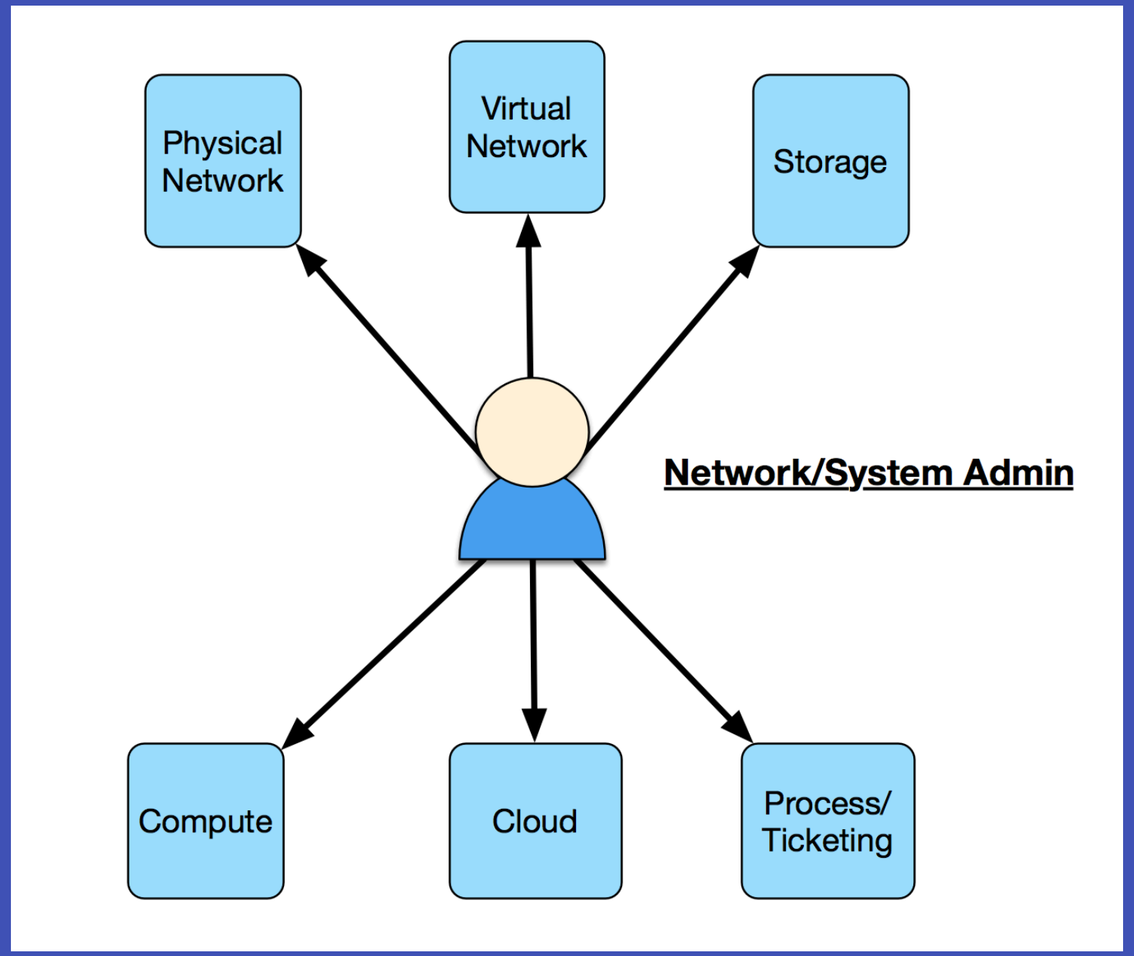
- Intent of the application is primary
- Devs don't know about the network - and they shouldn't.
- Corollary: AWS doesn't make you configure switches

Continuous Deployment and Testing for Networks

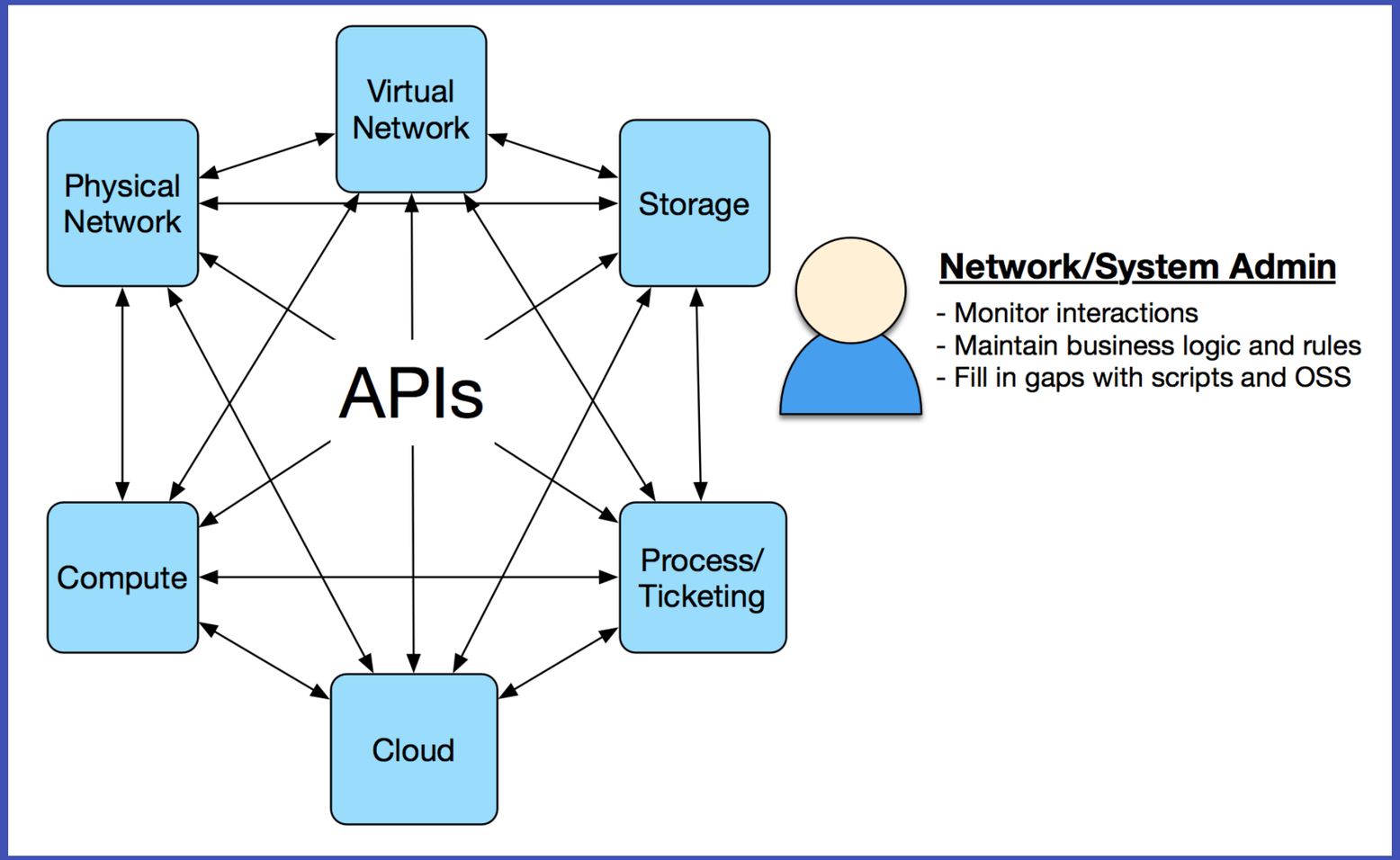


API is the new CLI?

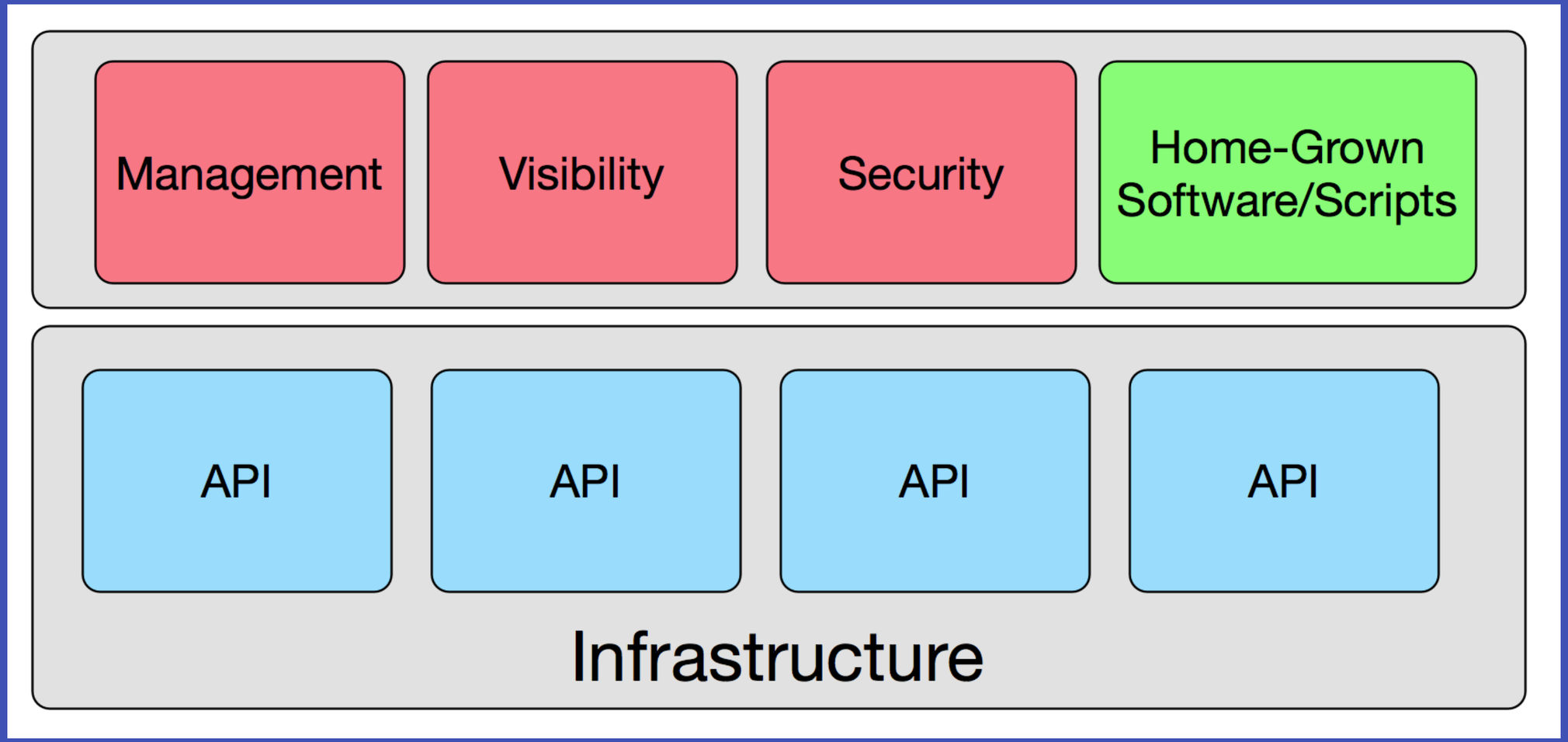
The NRE Transformation



The NRE Transformation



"Open Core"


Management
Visibility
Security
Home-Grown Software/Scripts
API
API
API
API
Infrastructure

Build Interesting Stuff

- Auto-remediation
- Streaming Telemetry (NFD14)
- Automated Verification of Network Services (detailed, not pings)

Mark Imbriaco
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Follow

When you're thinking about monitoring, start with the question "How do I know that the system is working?" Don't try to skip ahead to "How do I know what's wrong?" until you answer the first question.

12:14 PM - 16 Jan 2018

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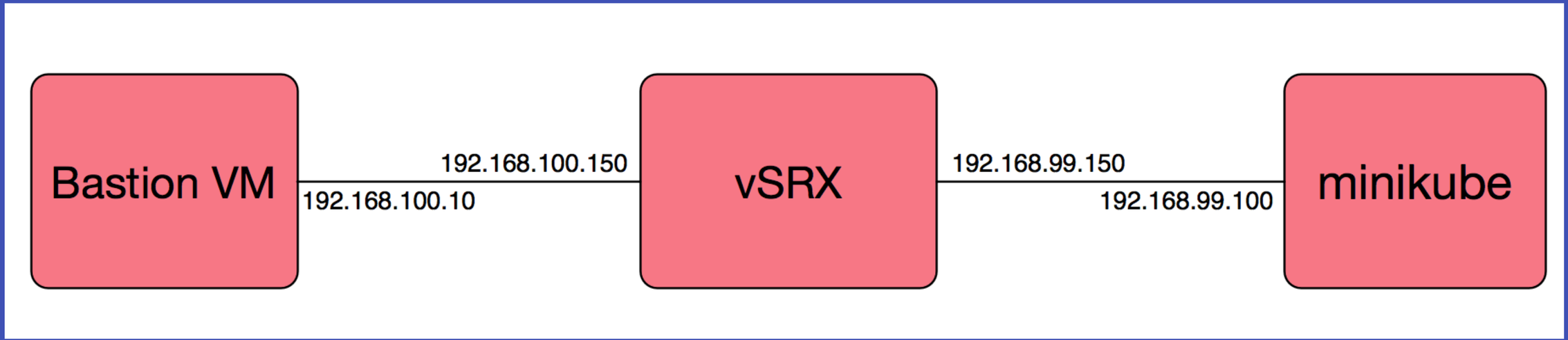
Stages of Verification

- Config-centric (selfish)
- Network-state-centric (still selfish but more realistic)
- Application-centric (ultimately the most valuable)

DEMO TOPOLOGY



NAPALM

- Thin abstraction on top of network device APIs (common methods)
- "getter" methods for retriving operational data
- "setter" methods for pushing configurations

Config-Centric Verification

- Specific to neteng workflow (apps folks don't care what config is on a switch)
- Diff WISB (golden config) vs WIRI (running-config)
- Assertions on specific configuration syntaxes (targeted audit)

DEMO

State-Centric Verification

- Closer to "real world" but still neteng-centric
- Configured BGP peers actually exist, routes are seen
- Interface statistics are within norms
- Can "go get" info, or perform assertions on streamed telemetry

napalm-verify

- http://napalm.readthedocs.io/en/latest/validate/
- Works from data retrieved via those operational "getters"
- Can also do basic reachability tests (i.e. verify target is pingable from device)

DEMO

Application-Centric Verification

- Application-sympathetic testing
- Faithfully replicate real-world traffic and run assertions resulting metrics
- Establish baselines

DEMO

Going Further?

- Query SDN/Contrail
- Sonobuoy
- Juniper NITA pro services
- Serverspec

Conclusion