Some thoughts on Automation

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UKNOF31
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Agenda

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- Somewhat wooly slides re: NetDevOps mindset
- **Potentially useful information about Netconf**
- **Free Software you can run today!**
- **Other automation frameworks to think about**
- An invitation to buy various circuits

This may be a little unstructured, sorry

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- I am a **believer**.

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- I am a believer in software.

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- I am a believer in software.
  - Inevitable future of network orchestration
- A few days work to build tools that help:
  - Consistent decision making
  - Consistent provisioning
  - Consistent troubleshooting

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Automation is not the product
Automation is the **enabler**

Consistency
Speed of Delivery
Ease of Support
Speed to integrate
Compliance
Integrated OSS/BSS

Confidence
Commodity

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Writing simple software will be a network engineer’s job tomorrow, as much as writing configuration is the job today

So where on earth can you start ?

Take one **single** (boring?) process and automate it out of existence

orry too much about your software quality on day one of the project

tool catches on, you're binning the first iteration (so make it simple to bin!)

exclusively focussed on delivery, saving money, saving effort, removing pain, le

Driven by a feedba

An example!

- Over 30 IXPs (and growing)
- Thousands of willing peers
- **Where do we have traffic and missing adjacencies?**

What makes this a good example of a first step?

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- Experience *reading* from the network
  - (If you start by *writing* then you're writing all your mistakes to production config!)
- It solves a real life problem/question so it has a feedback loop attached to it

Where to start with Netconf?

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- API to configure network devices
- Manage configuration and state
- XML RPC using SSH as transport
- Mirrors device configuration, capabilities

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```
<rpc-reply xmlns:junos="http://xml.juniper.net/junos/11.4R7/junos">
    <rpc>
        <get-bgp-summary-information/>
    </rpc>
    <cli>
        <banner/>
    </cli>
</rpc-reply>
```

```
<bgp-peer style="terse">
    <peer-address>5.57.80.1</peer-address>
    <peer-as>8550</peer-as>
    <input-messages>2191394</input-messages>
    <output-messages>1443405</output-messages>
    <route-queue-count>0</route-queue-count>
    <flap-count>343</flap-count>
    <elapsed-time seconds="1416870">2w2d9h</elapsed-time>
    <description>LONAP RS1</description>
    <peer-state format="Establ">Established</peer-state>
    <bgp-rib style="terse">
        <name>inet.0</name>
        <active-prefix-count>175</active-prefix-count>
        <received-prefix-count>3065</received-prefix-count>
        <accepted-prefix-count>3065</accepted-prefix-count>
        <suppressed-prefix-count>0</suppressed-prefix-count>
    </bgp-rib>
</bgp-peer>
<bgp-peer style="terse">
    <peer-address>5.57.80.2</peer-address>
    <peer-as>8550</peer-as>
    <input-messages>3492243</input-messages>
    <output-messages>1444988</output-messages>
    <route-queue-count>0</route-queue-count>
    <flap-count>304</flap-count>
    <elapsed-time seconds="5764942">9w3d17h</elapsed-time>
    <description>LONAP RS2</description>
    <peer-state format="Establ">Established</peer-state>
    <bgp-rib style="terse">
        <name>inet.0</name>
        <active-prefix-count>2457</active-prefix-count>
        <received-prefix-count>4809</received-prefix-count>
        <accepted-prefix-count>4809</accepted-prefix-count>
        <suppressed-prefix-count>0</suppressed-prefix-count>
    </bgp-rib>
</bgp-peer>
```

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WTF IS XML?

What does it actually look like in your code ?

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```
y:
  resultxml = jdev.rpc.get_bgp_summary_information()
cept Exception as err:
```

(using PyEZ – will explain shortly.)

Analyse it

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```
for bgp_sum in self.bgpxml.findall('.//bgp-peer'):
    if bgp_sum.find('peer-as').text == str(asn):
        list_peer_ip.append(bgp_sum.find('peer-address').text)
```

“Make a list of peering session linknet IPs adjacent to Asxxxxx

PyEZ ? Abstraction ?

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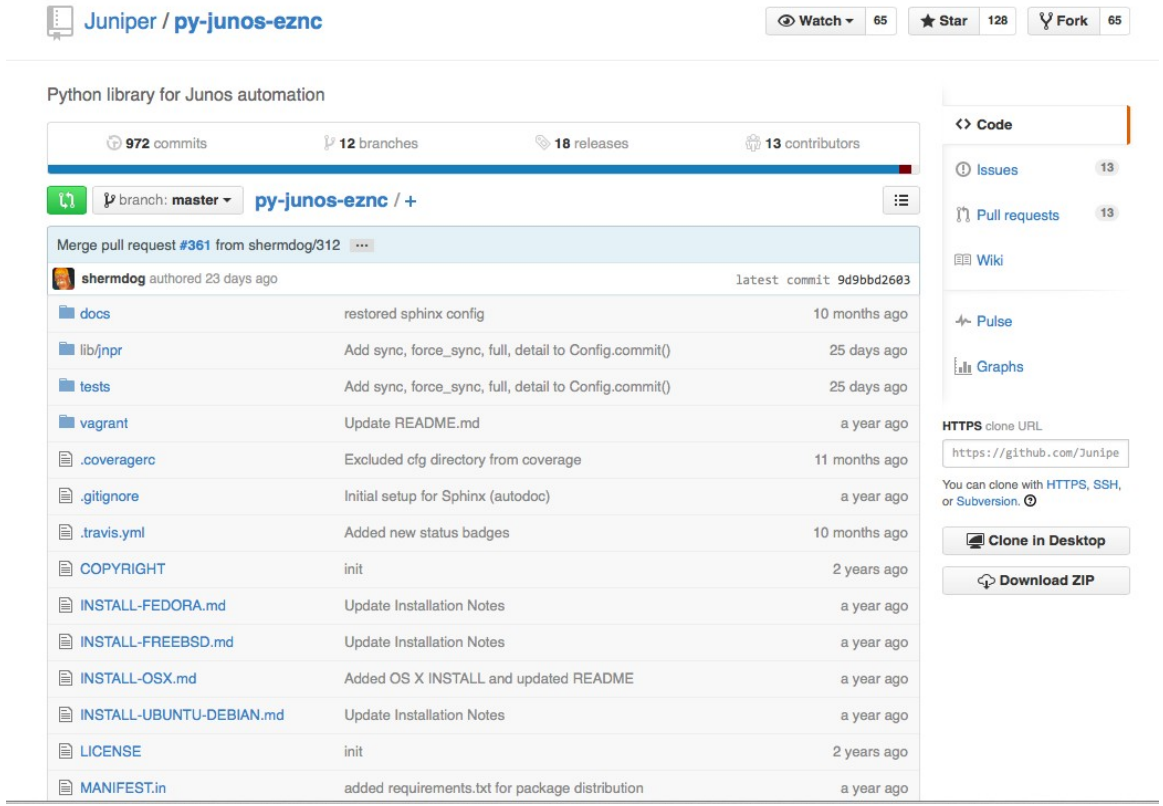

PyPeer, aiming to go a stage further

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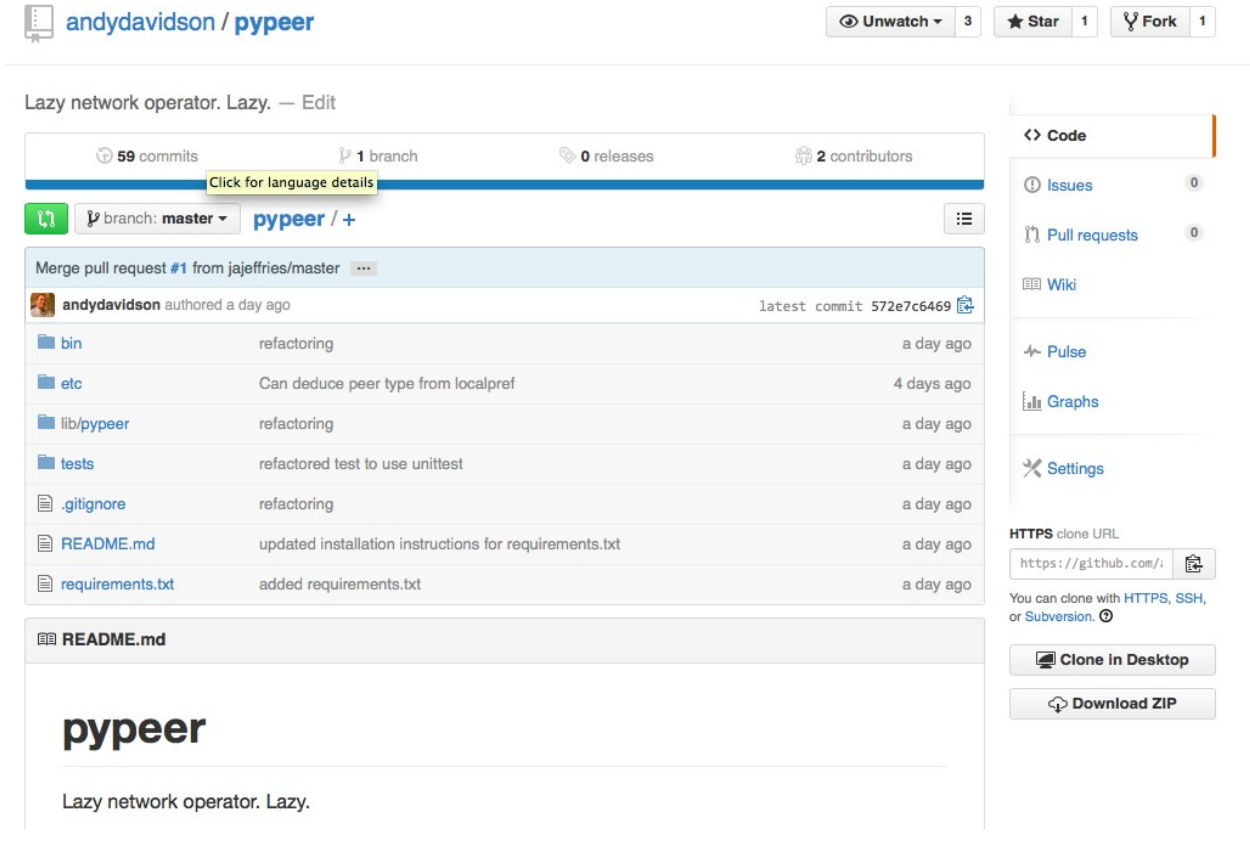

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```
for routexml in resultxml.findall('.//rt'):
    route = RouteData(routexml)
    print "destination: " + route.prefix() + "as-path: " + route.aspath()
```

Zero effort extensions for PyEZ

When kit gets real

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- Consuming data from the real world as well as your routers.
- Comparing your router’s view with the one in RIPE, Euro-IX DB, PeeringDB, etc.

When kit gets real

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- Consuming data from the real world as well as your routers.
- Comparing your router’s view with the one in RIPE, Euro-IX DB, PeeringDB, etc.
- I believe the youths call this a ‘mashup’

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```
peeringdb = PeeringDBClient()
list_their_exchanges = peeringdb.get_list_connected_ixp(peer_asn)
```

This is in PyPeer right now

So how am I doing with my example need for sofware?

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```
andy@ras1:~/src/pypeer$ python bin/get_missing_bgp_session_adj.py --asn 6
Missing exchanges are:set([64, 1, 5, 70, 87, 325, 804, 806, 359, 297, 48,
64: NL-IX (Neutral Internet Exchange)
1: Equinix Ashburn (Equinix Ashburn Exchange)
5: Equinix San Jose (Equinix San Jose / Bay Area Exchange)
70: Netnod Stockholm (Netnod Internet Exchange i Sverige AB)
87: BCIX (Berlin Commercial Internet Exchange)
325: Telx New York (TIE:New York, Telx Internet Exchange New York)
804: DE-CIX New York (DE-CIX, the New York / New Jersey  Internet Exchang
806: AMS-IX NY (AMS-IX New York)
359: France-IX (FranceIX)
297: LU-CIX ()
48: INEX LAN1 (Internet Neutral Exchange Association Ltd.)
255: Equinix Paris (Equinix Internet Exchange Paris)
```

In other words

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- Version one of a network engineer’s script^H^H^H^H^Hoftware:
  - Hack and stack
  - Copy and paste
  - Hemi-code stolen from stackoverflow.com
  - Iterate and improve with feedback

Iterate, iterate, iterate

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Snap platform

CloudRouter®

Netconf downsides

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- Although a “standard” quite vendor specific implementations
- Requires entry level programming skill
- Knowledge ends up living in scripts, not that portable.

Ansible

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- SSH + Python based orchestration
- “Playbooks” written for tasks
- Can be implemented across vendors
- Designed for servers

  Mixed unix/network environments will love this!

YANG

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- Modeling language for network configuration and state
  - Think of it as config as code … as config.
  - YANG -> XML -> Device
  - More Cross Platform
  - Example draft-shaikh-idr-bgp-model-00

```
grouping bgp-group-common-configuration {
  description "Configuration items that are applied at the peer
  group level";

  // currently a placeholder in case we identify config that is
  // really only applicable at the group level
}

grouping bgp-group-neighbor-common-configuration {
  description "Configuration items that are applied at the peer
  or peer group levels";

  leaf auth-password {
    type string;
    description
      "Configures an MD5 authentication password for use with
      neighboring devices.";
  }

  leaf peer-type {
      type peer-type;
      description
        "Explicitly designate the peer or peer group as internal
        (iBGP) or external (eBGP).";
  }
```

OpenFlow

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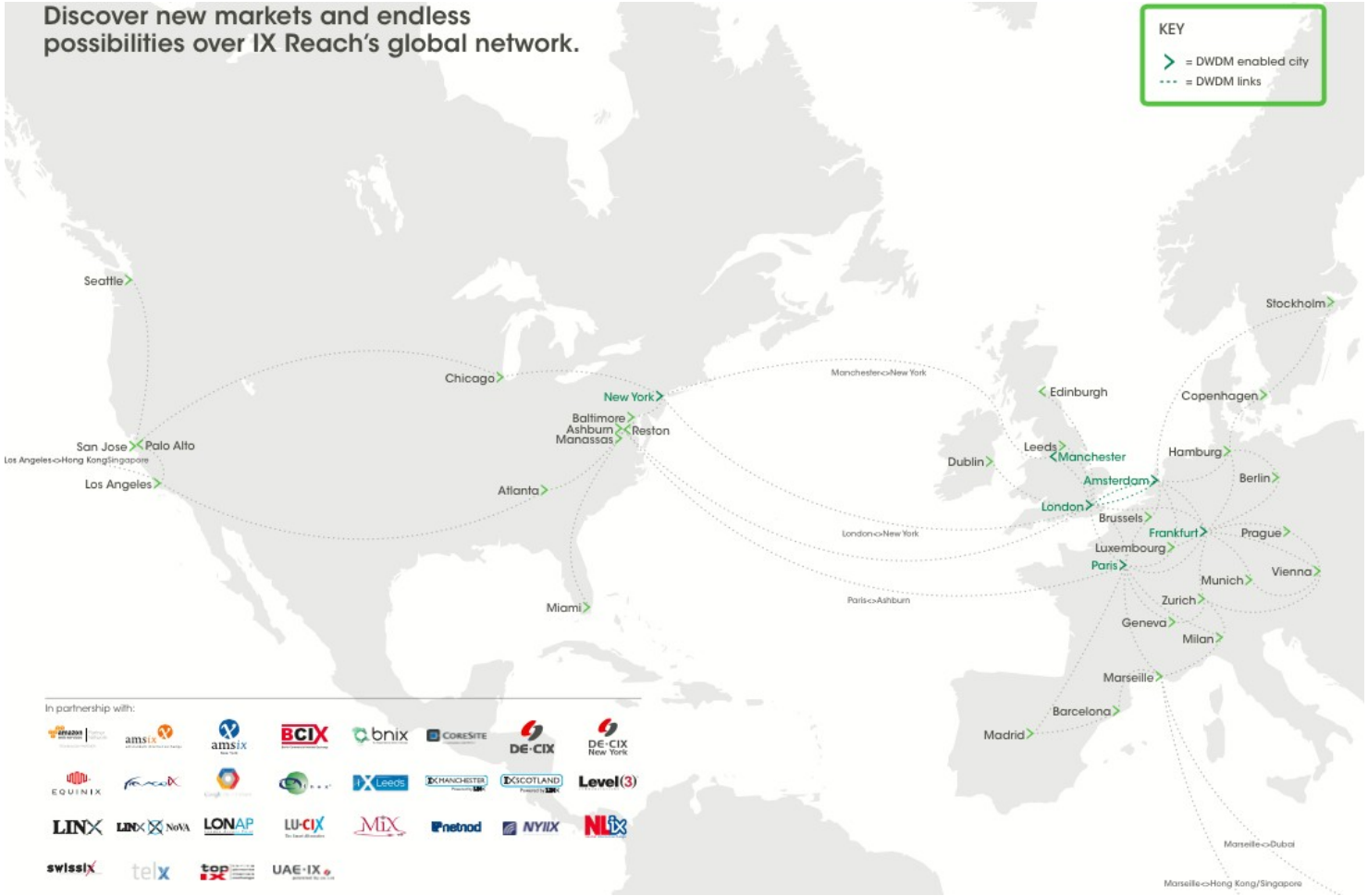
- “Holistic” network orchestration/management
  - Arguably more scalable than scripts
  - Arguably more likely to get cross-vendor support?
  - Config as “apps”.

Discover new markets and endless possibilities over IX Reach's global network.



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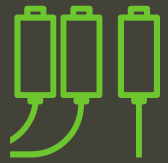
Instantly grow your network by connecting to a rich platform of global locations, Internet Exchanges and cloud providers through IX Reach.



WHOLESALE CONNECTIVITY

Quickly and easily increase your network footprint without investing in infrastructure.

DWDM CONNECTIVITY

Transparent waves offer a scalable solution for growing bandwidth requirements.

CLOUD CONNECTIVITY

Connect seamlessly and securely from your offices and data centres to the AWS Cloud.

COLOCATION

Benefit from our highly flexible colocation solutions designed to meet your specific needs.

BGP TRANSIT

Ideal for mission-critical applications requiring a low latency service to end-users.

IX REMOTE PEERING

Enjoy near-instant network expansion by connecting to one or more key IXs virtually.

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