

# MASTER OF PUPPET



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## WHY

The ATLAS online farm is comprised of ~4000 servers. Keeping all these systems always correctly configured is a difficult task.

In the beginning there were not many tools available. With large computing farms becoming more commonplace, and Puppet being widely used and accepted by the IT industry, Puppet rapidly exceeded the capabilities of the custom tools the Systems Administrators had built.

The previous method of configuring these servers, using Quattor and a hierarchical scripts system, was cumbersome and restrictive:

- ★ Systems Administrators needed to know multiple different scripting languages in order to make simple change
- ★ configuration files were kept in four different places

Puppet instead allowed for a single application, which could be used in both our local and net booted systems:

- ★ code is re-usable and also much easier to maintain
- ★ the netbooted image is now also built in a chrooted environment by Puppet

## WHAT

## ADMIN: First implementation at CERN

## DATE: 2010-2016+

```

Class {'install::configuration_management_system':
  evaluate::packages {'configuration_management_systems':}

  package {
    ['puppet','hiera','facter']:  ensure => installed, version => 2.7.3;
    ['chef','cfengine']:          ensure => absent;
  }
}

```

## WHEN

It was not an easy task to move away from the darkness:

- ▶ initially began to work on the conversion with SLC5
- ▶ with the migration to SLC6, Quattor was dismissed and Puppet took over

Over the next two years, many further additions and tweaks were added:

- ▶ we are now able to completely re-install a local boot system in under an hour
- ▶ build a netbooted image, ready for deployment, in a couple of minutes

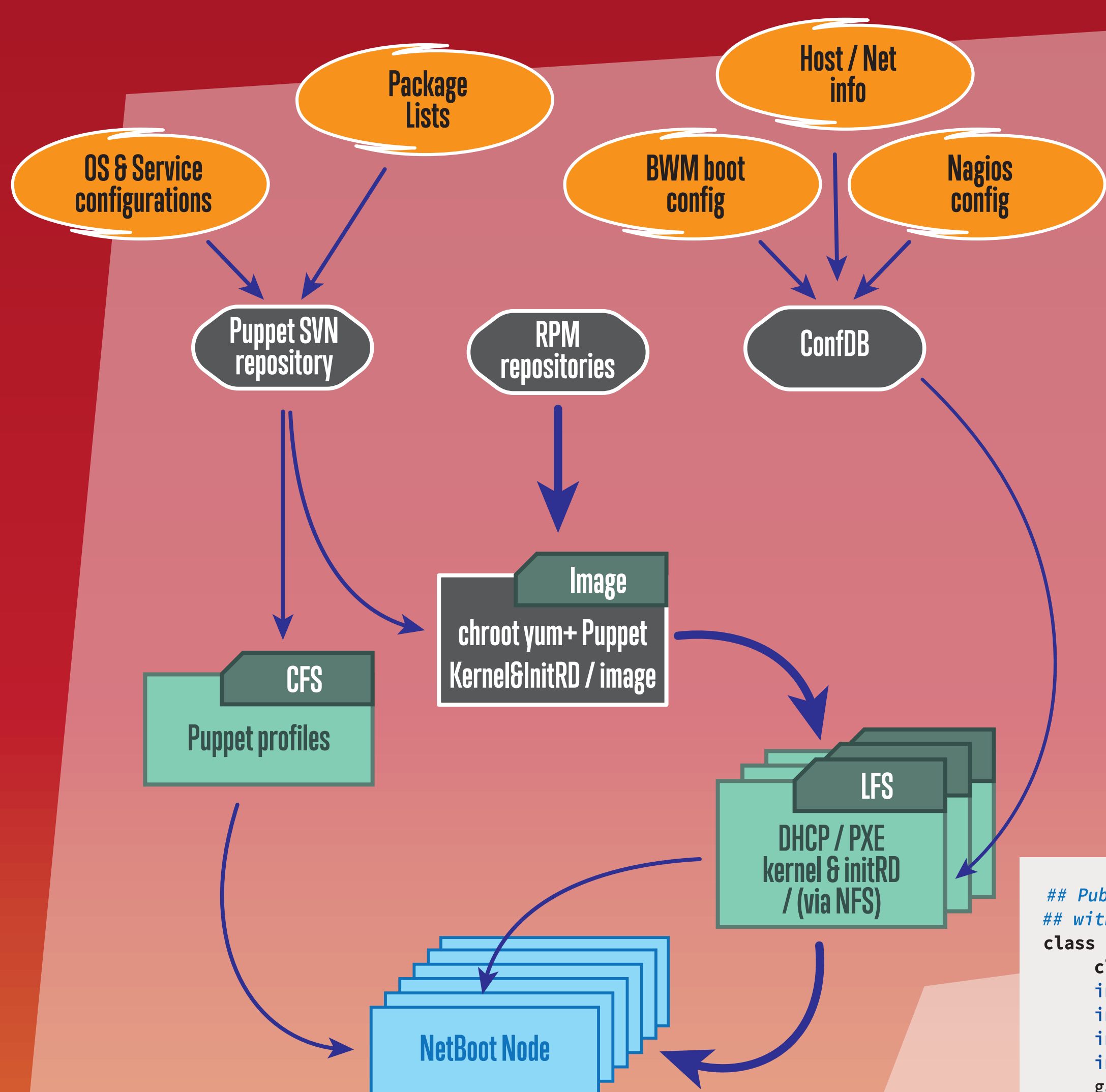
## HOW

Puppetising the "beast" that is ATLAS, is far from an easy task:

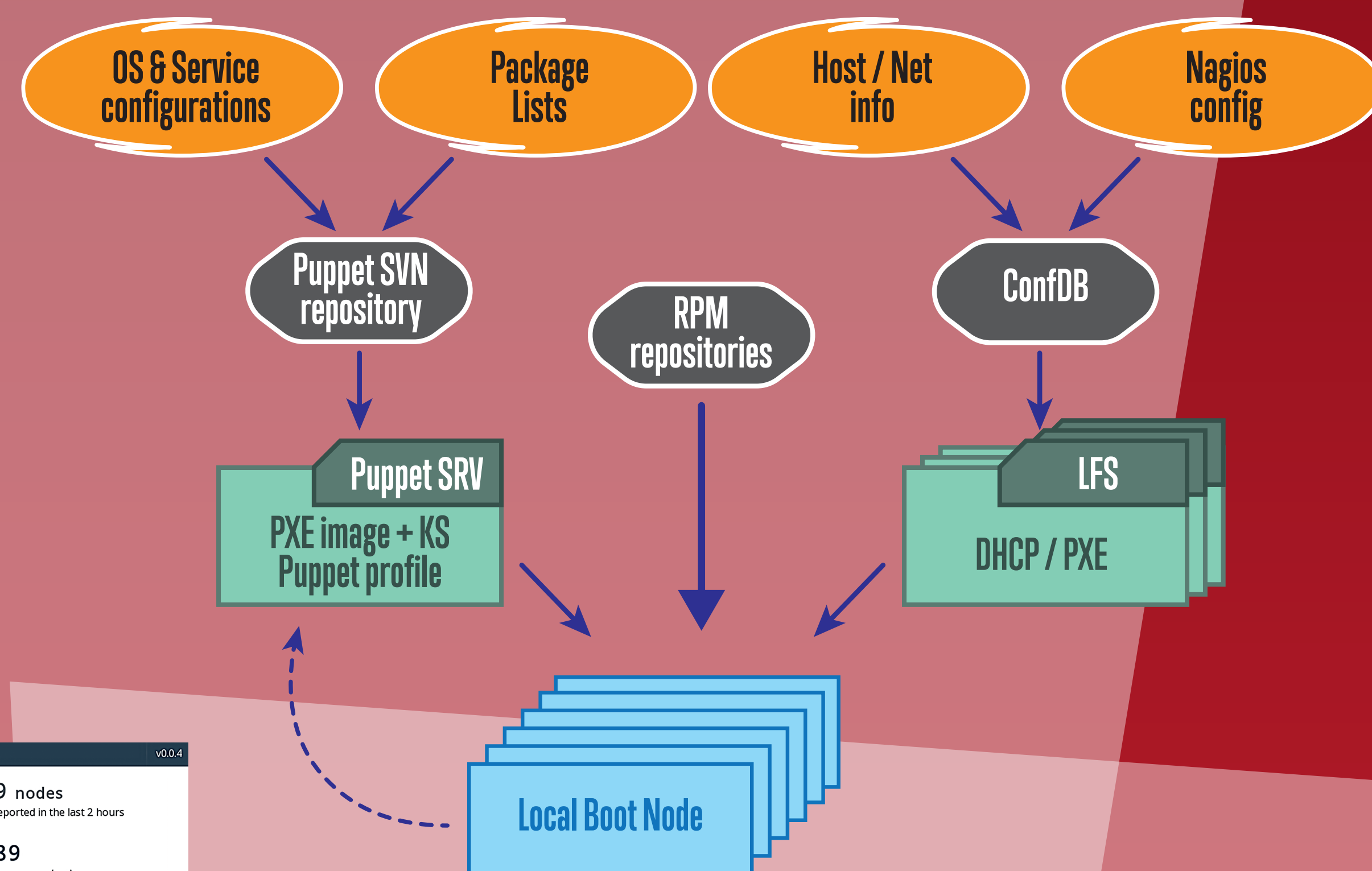
- > during the first half of 2016 we again started migrating from Puppet 2.7 to Puppet 3.3
- > this required many changes to all the code to comply with the new and deprecated features in ~20 000 lines of code

One of the advantages of Puppet is that it is Open Source, and this allows interaction with a very large community:

- > unfortunately many of our needed configurations are either complex or unique
- > custom modules are required for almost all our manifests
- > allows us to patch issues which may arise
- > profit by forking existing modules for our needs



Nodes status detail (3370)	Status	Hostname	Report
1 node with status failed	Failed	atleg041-ep.sern.ch	Sep 07 2016 - 18:20:43
0 nodes with status pending	Pending	atleg041-ep.sern.ch	Sep 07 2016 - 18:20:03
3447 Population	OK	pc-lar-01-ep1.sern.ch	Sep 07 2016 - 18:00:19
2375219 Resources managed	OK	app-rtk-rtc-blade-00.sern.ch	Sep 07 2016 - 18:20:03
689 Agg. resources/node	OK	pc-afp-01.sern.ch	Sep 07 2016 - 18:31:14
	OK	pc-af1-eon-01.sern.ch	Sep 07 2016 - 19:22:23
	OK	pc-af1-eon-02.sern.ch	Sep 07 2016 - 18:27:18
	OK	pc-af1-01.sern.ch	Sep 07 2016 - 18:05:38



```

## Public/build nodes
## with development tools
class nt_tbed::public {
  class { "nt": type=>"tbed::public" }
  include gen::hostnames::simple
  include auth::selinux::enforcing
  include nt_tbed::base::client
  include ganglia::clt
  ganglia::gmond::plugin {"users":}

  ## shared, single ssh-host-key
  include auth::ssh::hostkeys

  ## Applications
  include nt_tbed::cfg::develtools
  ## HLT
  include tdaq::hlt::packages
  include tdaq::hlt::eos

  package {
    ## needed by wish, ticket 1630
    ["tk"]: ensure=>present;
    ## PDF viewer, ticket 1664
    ["gv"]: ensure=>present;
  }
}

```

## CONCLUSIONS

Over the last 6 years, Puppet has continually evolved to produce a highly complex yet effective system that, in its current state, is capable of maintaining a sane state of ~4000 machines under the control of the ATLAS TDAQ SysAdmins.

In the 3rd quarter of 2016 we migrated to Puppet 3.6 to prepare for CentOS 7 which will become the new OS of choice at CERN, and while this was much easier due to previous experience of the many other migrations, there is however still much to be done, such as the migration from EXTDATA to Hiera, which will allow us to keep all site-specific data out of the manifests, making it much easier to maintain.

Another thing to consider is that while a net booted system is still much quicker to "reboot", the difference is getting much smaller. Local installed systems do not require the complexity of the net booted infrastructure and will allow for much more flexibility and better support of the various sub-detectors.