



UNIVERSITY OF
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Configuration Management with Cobbler and Puppet

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Goals

- Single Installation and Configuration Management System for all Linux variants for the whole department.
- Easy to install new machines without multiple entries at various locations.
- One click should reinstall and configure a system to previous working state without human intervention.
- Secure mechanism for distributing machine secrets. e.g. ssh host keys, & Puppet certificates.
- Multiple admins can install or configure systems in their respective domains without affecting others.
- Not everyone has to understand installation and configuration system in detail before installing a machine



Target Systems

- Tier-2 Grid System
 - Service Nodes
 - Storage
 - Batch System and WN's
- Local Cluster
 - Batch System and Compute Node
 - NFS server and Lustre servers
 - Web Server
 - Interactive machines
- Desktop and Special Machines
 - SL Desktop
 - Ubuntu Desktop
 - Laptops
 - Data Acquisition Systems
 - Monitoring Systems
- OpenStack Cloud



- Looked into various options
 - Cfengine V3
 - Foreman with Puppet
- Finally decided
 - Cobbler for installation and bootstrapping configuration management system
 - Easily extensible with inbuilt hooks and triggers
 - Puppet as configuration management system
 - Large number of publicly available modules
 - A lot of momentum toward puppet specially in WLCG sites
 - Hierarchical Data Language(Hiera) as External Node Classifier(ENC) or place for site specific data
 - Now part of puppet

Overview of Cobbler

- Installation through Cobbler, setting up of partition tables and network
- Using Cobbler triggers to create ssh and generate puppet client certificate
- Customization of Cobbler to abstract away some details
- Sucking data from external inventory database
- Transfer of secret keys to systems through a security window
- Use of Cobbler snippets to generate Kickstart configs dynamically
- First run of Puppet in batches using puppet tags





Orchestra

powered by Cobbler

Configuration

- Distros
- Profiles
- Systems
- Repos
- Images
- Kickstart Templates
- Snippets
- Management Classes

Resources

- Packages
- Files

Actions

- Import DVD
- Sync ☼
- Reposync ☼
- Hardlink ☼
- Build ISO ☼

Cobbler

- Settings
- Check
- Events
- Online Documentation
- Online Help Chat

Adding a system from the Network Registration DB

Input the hostname of the desired system here to check the registration database, with the fqdn if you know it. If I do not find any hits for that FQDN, I will also search for just the hostname part in the database.

hostname:

[Next](#)



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Adding a System

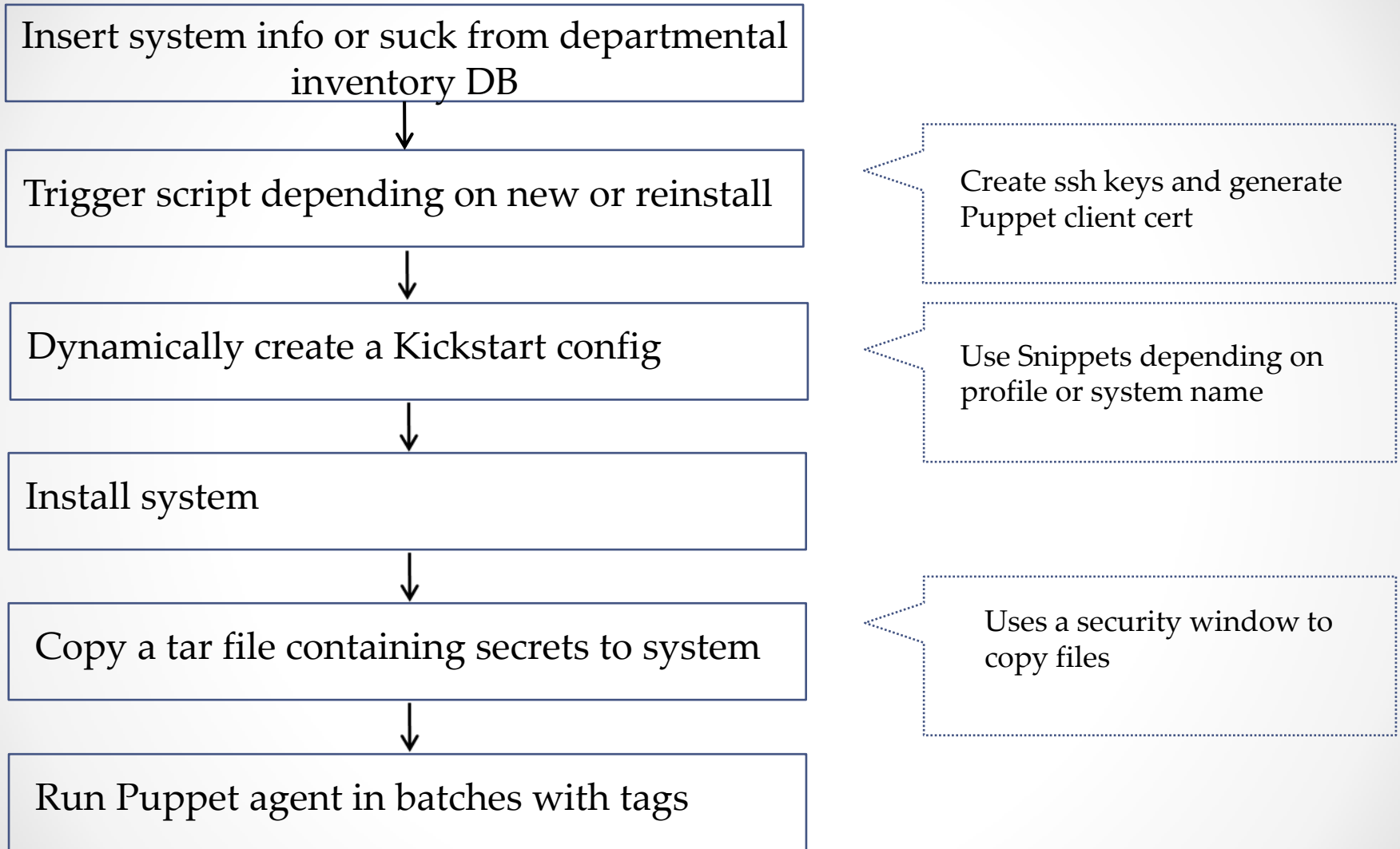
⇒ General

| | |
|---------|---|
| Name | <input type="text" value="pplxdt02"/> |
| Owners | <input type="text" value="admin"/> |
| Profile | <<None>> |
| Image | <<None>> |
| Comment | <div style="border: 1px solid #ccc; height: 80px;"></div> |

⇒ Physics

| | |
|-------------------------------------|--|
| IP Address: -Don't forget to update | <input type="text" value="163.1.243.190"/> |
| DNS if required | |
| MAC Address | <input type="text" value="00:25:64:aa:7d:15"/> |
| Install State | installing |
| subdept | particle |
| Authentication Type | ad_krb5_auth |
| Machine Type | desktops |

Cobbler Workflow



- Distros
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- Systems
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- Images
- Kickstart Templates
- Snippets
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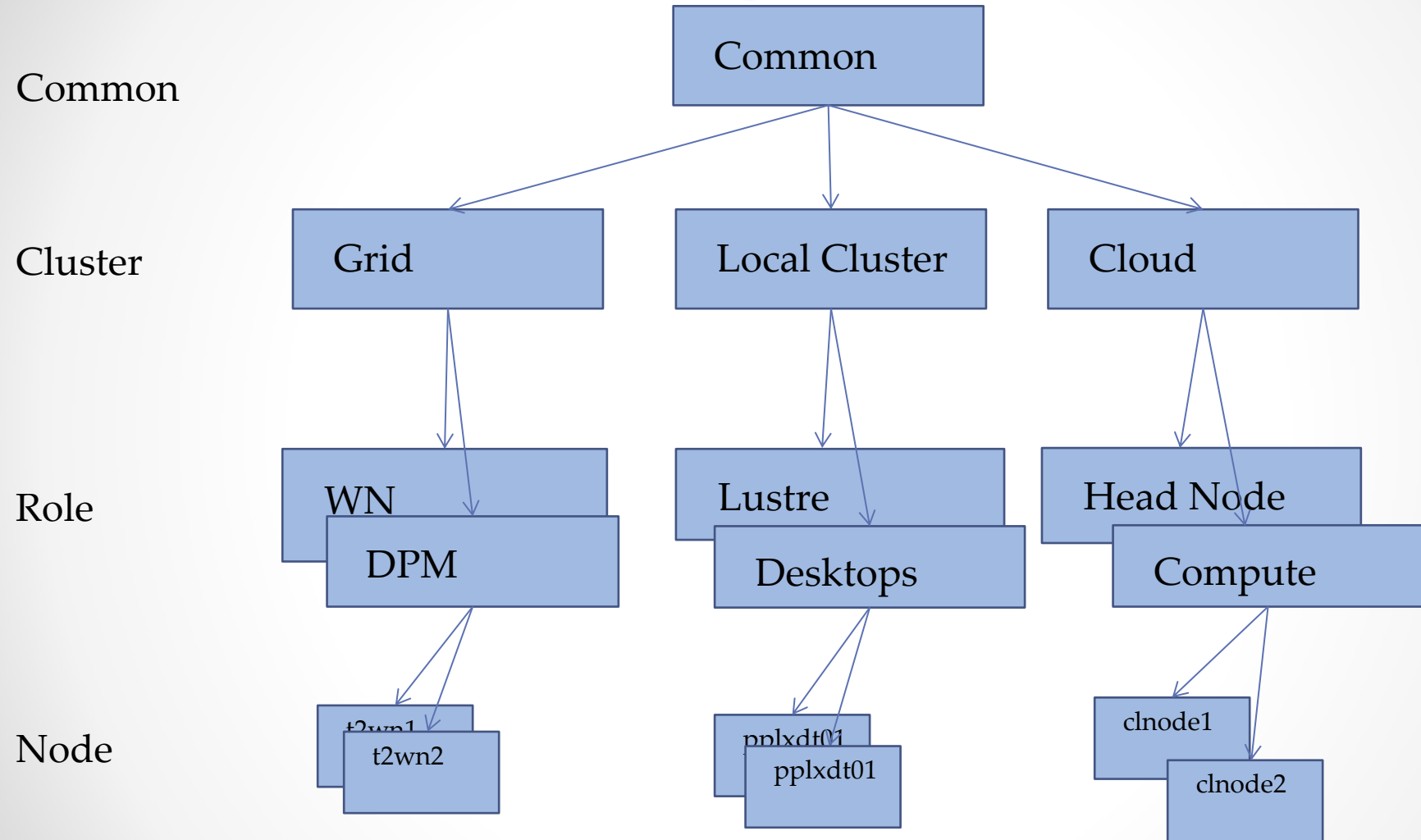
Create New System Batch Actions Go Items/page: 50 Page 2

| Name ↓ | Profile | Status | Netboot_Enabled | Actions |
|--|----------------|------------|--------------------------|---|
| <input type="checkbox"/> t2dpm1-v6.physics.ox.ac.uk | sl6-pp | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se39.physics.ox.ac.uk | sl6-pp-storage | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se40.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se41.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se42.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se43.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se44.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se45.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se46.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se47.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se48.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se49.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se50.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se51.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se52.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2se53.physics.ox.ac.uk | sl6-fileserver | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2squid03.physics.ox.ac.uk | sl6-pp | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |
| <input type="checkbox"/> t2toraue03.physics.ox.ac.uk | sl6-pp | production | <input type="checkbox"/> | Edit Copy Rename Delete View Kickstart |

Overview of Puppet Setup

- Some standard Puppet modules from Puppet Forge like stdlib, mysql and firewall etc.
- Use of modules available at CERN-OPS, HEP-Puppet etc.
- Create fork in local Git repo
- Push back changes to original module on GitHub
- Use of wrappers for unique site specific problems.
- All home grown Puppet modules available on GitHub.
- No site specific data in production modules.
- Using Hiera for site specific data.

Hierarchy of Nodes



- Every node has only one node type e.g grid_wn, lustre_mds_server, sl_pp_desktop etc.
- Generally it inherits from one base class like grid, desktop, cloud etc.
- Every machine has two custom Factor 'facts', one for base type and one for node type.
- Puppet runs after first boot.

```
# Setup node type and base facts  
puppet agent --test --tags kickstart
```

```
# Setup all the repositories with correct priorities  
puppet agent --test --tags repo
```

```
# First full run  
puppet agent --test
```

Modules Use Cases

CVMFS : <https://github.com/cvmfs/puppet-cvmfs>

- Very useful
- Fast bug fixes and responsive

```
include cvmfs
```

```
# Hiera
```

```
cvmfs_quota_limit: '20000'
```

```
cvmfs::mount:
```

```
  atlas: {}
```

```
  lhcb: {}
```

```
  atlas-condb: {}
```

```
  alice.cern.ch: {}
```

```
  cms.cern.ch:
```

```
    cvmfs_env_variables:
```

```
      CMS_LOCAL_SITE: '/cvmfs/cms.cern.ch/SITECONF/T3_UK_SGrid_Oxford'
```

Set up CVMFS on all WN's for LHC VO's

Module Use Cases

voms: <https://github.com/cernops/puppet-voms>

- Set up voms server and voms client
- Hardly anyone needs voms server but everyone has to install voms clients.
- Use a wrapper to just install voms client
 - <https://github.com/oxford-physics/puppet-setup-voms-client>

```
# Pass list of VO's directly or through Hiera
```

```
$vo_list = [],
```

```
setup_voms_client{ $vo_list: }
```

Conclusion and Concerns

- The question of ownership of modules.
- Support, Bug fixes.
- Correlation between software release and module release, specially for grid MW.
- More collaboration in puppet module development between UK sites
- It is not always trivial to integrate external modules because of different ways site uses puppet
- Generally we are happy with cobbler and puppet setup.



Resources

<https://github.com/HEP-puppet>

<https://github.com/oxford-physics>

<https://twiki.cern.ch/twiki/bin/view/HEPIX/ConfigManagement>

Thank You

Thanks to

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Luke Kreckzo

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For endless discussions about how to use puppet properly

