Systems Automation

With Puppet

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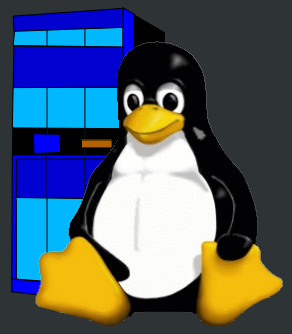
Warning

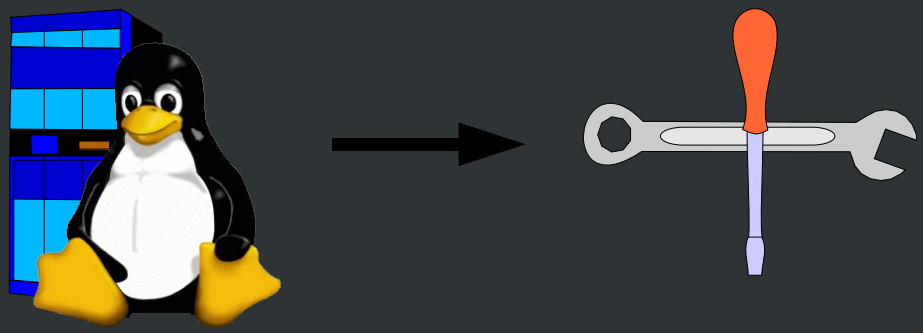
Many of the slides are copied! :)

Typical System Life cycle



Installation

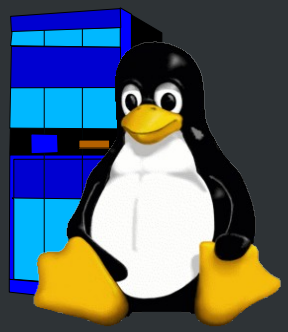
Typical System Life cycle



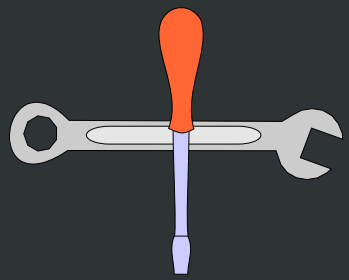
Installation

Initial
Configuration

Typical System Life cycle



Installation



Initial
Configuration

Fixes
Updates
Audits

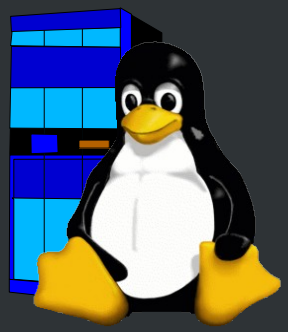
The Challenges

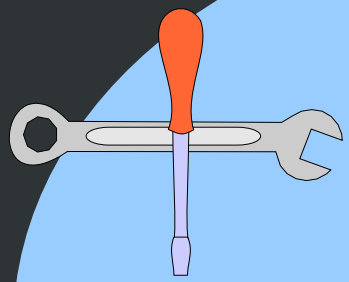
- Keep our systems "harmonized"
- Know whats going on on each system
- Replace a server if it dies or to be able to add another server that is exactly like it
- Similar Applications, different OS's
- Push out changes to all the servers that need a particular change
- Stop duplicating effort
- Go home early

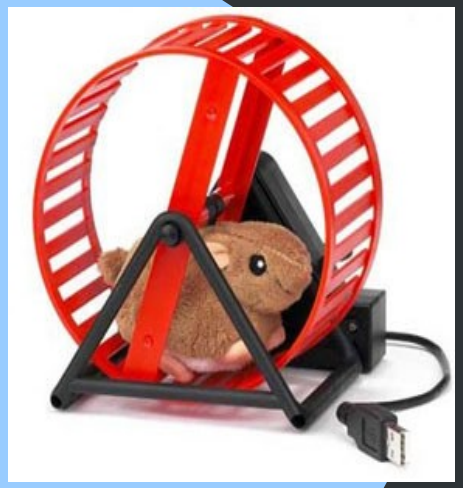
How to solve the problem?

- The Manual way
  - Log in and do it
  - Thats OK only for a limited set of machines...
- Install time auto configure
  - Kickstart, jumpstart etc, with a post installation scripts
- But then what?
  - How to push a change?
  - No History of changes, audit etc...
- Or....

Puppet Life cycle







Puppet

Installation

Initial Configuration

Fixes
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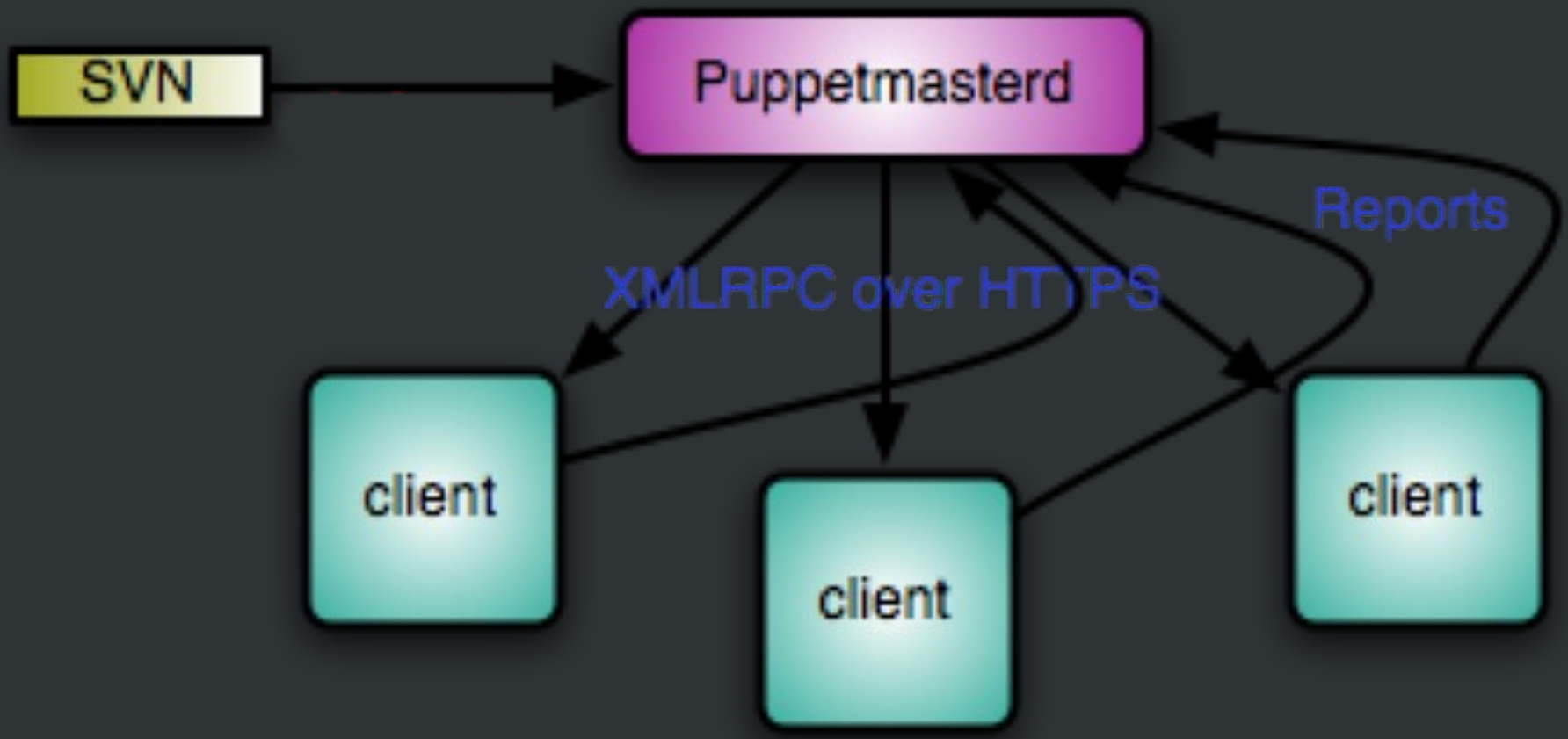
What is Puppet?

- A GPL Open Source Project written in Ruby
- A declarative language for expressing system configuration
- A Client and server
- A library to realize the configuration
- Puppet is the abstraction layer between the system administrator and the system
- Puppet requires only Ruby and Facter
- Client runs every 30 minutes by default

Puppet components



Puppet Types

A Type is a particular element that Puppet knows how to configure

- Files (content, permissions, ownership)
- Packages (ensure installed or absent)
- Services (enabled/disabled, running/stopped)
- Exec (run commands)
- Full List: cron, exec, file, filebucket, group, host, interface, k5login, mailalias, maillist, mount, nagios*, package, service, sshkey, tidy, user, yumrepo, zone

Example: Managing sudoers file

```
file { “/etc/sudoers”:
    ensure => file,
    owner  => root,
    group  => root,
    mode   => 600,
    source => “puppet://server/files/sudoer”
}
```

Dependencies

“require” and “before” / “after” settings ensures that types are applied in the correct order

```
file { “/etc/sudoers”:
   ...
   require => Package[sudo]
}
package { “sudo”:
   ensure => present,
   before => File[“/etc/sudoers”]
}
```

Dependencies - continued

- “notify” and “subscribe” settings can trigger cascaded updates
- Particularly useful in services, exec

```
file { “/etc/ssh/sshd_conf”:
   ...
   notify => Service[“sshd”]
}

service { “sshd”:
   subscribe => File[“/etc/ssh/sshd_conf”
}
```

What is Facter?

- Facter gathers information about the client, which can be used as variables within puppet.
- You can add custom facts as needed.

```
package {"sshd":
  ensure   => installed,
  name     => $operatingsystem ? {
              solaris => "IFKLssh",
              default => "openssh-server"
    }
}
```

Example Facts

```
$ sudo facter
architecture => amd64
domain => sin.infineon.com
facterversion => 1.3.8
fqdn => sinn1636.sin.infineon.com
hardwaremodel => x86_64
hostname => sinn1636
ipaddress => 172.20.88.132
kernel => Linux
kernelrelease => 2.6.24-16-generic
lsbdistcodename => hardy
lsbdistdescription => Ubuntu 8.04
lsbdistid => Ubuntu
lsbdistrelease => 8.04
macaddress => 00:1c:25:14:26:ab
manufacturer => LENOVO
memorysize => 1.94 GB
processorcount => 2
puppetversion => 0.24.4
rubysitedir =>
    /usr/local/lib/site_ruby/1.8
rubyversion => 1.8.6
```

What is a Class?

- A named collection of type objects
- Can include or inherit from other classes

```
class sudo_class {
   include foo_class
   file { “/etc/sudoers”:
      ...
   }
   package{ “sudo”:
      ...
   }
}
```

Class inheritance

```
class afile {
  file { “/tmp/foo”:
    ensure => file
    source => “/src/versionA”
  }
}
class another_file inherits afile {
  File[“/tmp/foo”] {
    source => “/src/versionB”
  }
}
```

What is a Node ?

- A configuration block matching a client
- Can contain types, classes
- “default” node matches any client without a node block

```
node “ohad.myself” {
   include sudo_class
   include other_class
}
```

External Node

- Node definitions can be defined outside of puppet - LDAP, external script
- Ideal for sites with too many nodes to bother pre-creating

Classes and definitions

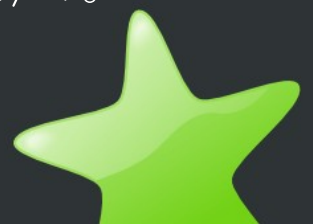
- Classes are groups of resources.
- Definitions are similar to classes, but they can be instantiated multiple times with different arguments on the same node.

```
class apache2 {

   define simple-vhost ( $admin = "webmaster", $aliases, $docroot) {

     file { "/etc/apache2/sites-available/$name":

       mode    => "644",

       require => [ Package["apache2"], Service["apache2"] ],

       content => template("apache/vhost.conf"),

 } } }

node debiantest {

     include apache2

     apache2::simple-vhost { "debian.example.com":   docroot =>
     "/var/www/debian"}

     apache2::simple-vhost { "test.example.com": docroot =>
     "/var/www/test"}
```

vhost.conf template

- Puppet uses Ruby's ERB template system:

```
<VirtualHost *>
        ServerAdmin     <%= admin %>
        DocumentRoot    <%= docroot %>
        ServerName      <%= name %>
<% aliases.each do |al| -%>
        ServerAlias     <%= al %>
<% end -%>
        ErrorLog  "|/usr/bin/cronolog /var/log/apache/<%=
  name %>/%Y-%m/error-%d"
        CustomLog "|/usr/bin/cronolog /var/log/apache/<%=
  name %>/%Y-%m/access %d" sane
</VirtualHost>
```



Templates output

```
# more /etc/apache2/sites-available/debian.example.com
<VirtualHost *>
        ServerAdmin     system@example.com
        DocumentRoot    /var/www/debian
        ServerName      debian.example.com
        ServerAlias     debiantest.example.com
        ServerAlias     debian

        ErrorLog  "|/usr/bin/cronolog
  /var/log/apache/debian.example.com/%Y-%m/error-%d"
        CustomLog "|/usr/bin/cronolog
  /var/log/apache/debian.example.com/%Y-%m/access-%d" sane
</VirtualHost>
```

OS API - It also works the other way around:

```
$ ralsh user levyo
user { 'levyo':
    password => 'absent',
    shell => '/bin/bash',
    ensure => 'present',
    uid => '49960',
    gid => '49960',
    home => '/home/levyo',
    comment => 'Ohad Levy',
    groups =>
     ['adm','dialout','fax','cdrom','floppy','tape','audio','dip','plugdev','scanner','fuse','lp
     admin','admin']
}
```

Getting Started

- Install puppet (yum/apt-get install puppet) or install ruby, gem install facter/puppet.
- Setup the puppet server (puppetmaster) – use version control!
- Write a manifest for your node.
- Start puppet master on the server
- Run puppetd on the client

Next steps - modules

- Modules allow you to group both the logic and the files for an application together.
- Puppet automatically searches its module path to find modules.
- Modules can contain four types of files, each of which must be stored in a separate subdirectory:
  - Manifests - must be stored in manifests/, and if you create manifests/init.pp then that file will be loaded if you import the module name directly, e.g. import "mymodule".
  - Templates - must be stored in templates/, and the module name must be added to the template name: template("mymodule/mytemplate.erb")
  - Files - stored in files/, these are available from the file server under modules/<module name>/files/<file name>.
  - Plugins – additional types, providers or facts.

File server and File Bucket

- Puppet also includes a file server which you can use for transferring files from the server to the client.
- If you configure it, puppet can also save a backup of each file that is changed on the client to the server. The backups go in a filebucket and can be retrieved later.

Some more info

- Puppet uses SSL for all communications, therefor it includes a CA, you can automatically sign CSR or use puppetca tool to mange them.
- Storeconfig, option to save machine states(facts, configuration runs) and special facts (e.g. SSH keys) in a database.
- Reporting, puppet has a few reporting options, most common are emails with changes, RRD files, yaml files and puppetshow web interface.
- Puppet HA, load balancing etc.

Conclusions

- We're all stuck on the hamster wheel
- Makes easy stuff easy, hard stuff possible
- Similar projects
  - cfengine
  - bcfg2
- Additional Resources
  - http://reductivelabs.com/trac/puppet
  - http://reductivelabs.com/trac/puppet/wiki/LanguageTutorial
  - http://reductivelabs.com/trac/puppet/wiki/CompleteConfiguration
  - #puppet on irc.freenode.org