EXPERIMENT NO: 10

Date of Performance	
Date of Submission	

AIM

To install and Configure Pull based Software Configuration Management and provisioning tools using Puppet

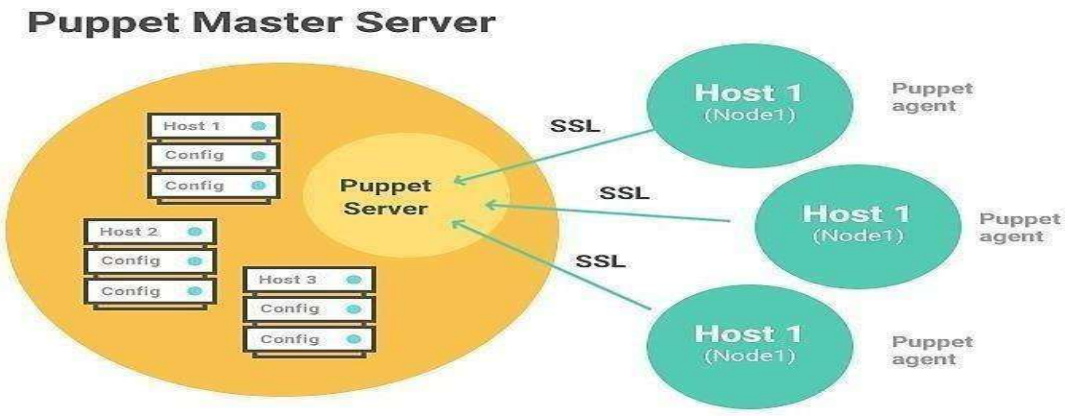
PROBLEM DEFINITION

Set up and configure pull-based software configuration management and provisioning tools with Puppet.

THEORY

Configuration Management: Configuration management is the process of maintaining software and computer systems (e.g., servers, storage, networks) in a known, desired, and consistent state. It also allows access to an accurate historical record of system state for project management and audit purposes. System Administrators mostly perform repetitive tasks like installing servers, configuring those servers, etc. These professionals can automate these tasks by writing scripts. However, it is challenging when working on a massive infrastructure. Configuration management tools like Puppet were introduced to resolve such issues.

Puppet: Puppet is a system management tool for centralizing and automating the configuration management process. Puppet is also used as a software deployment tool. It is an open-source configuration management software widely used for server configuration, management, deployment, and orchestration of various applications and services across an organization's infrastructure. Puppet is specially designed to manage the configuration of Linux and Windows systems. It is written in Ruby and uses its unique Domain-Specific Language (DSL) to describe system configuration.



Puppet performs the following functions:

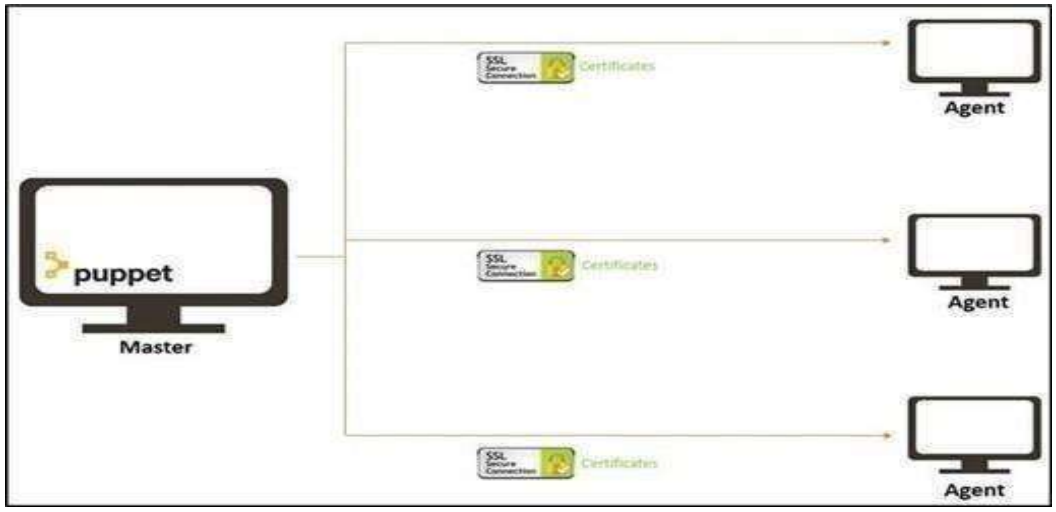
- Puppet allows you to define distinct configurations for every host.
- The tool continuously monitors servers to confirm whether the required configuration exists or not and if it is not altered. If the configuration is changed, the Puppet tool will revert to the pre-defined configuration on the host.
- It also provides control over all the configured systems, so a centralized change gets automatically effected.
- It is also used as a deployment tool as it automatically deploys software to the system. It implements infrastructure as code because policies and configurations are written as code.

Pull-based deployment model: In this deployment model, individual servers contact a master server, verify and establish a secure connection, download their configurations and software, and then configure themselves accordingly—for example, Puppet and Chef.

How Puppet works: Puppet is based on a Pull deployment model, where the agent nodes check in regularly (every 1800 seconds) with the master node to see if anything needs to be updated in the agent. If anything needs to be updated, the agent pulls the necessary Puppet codes from the master and performs the required actions.

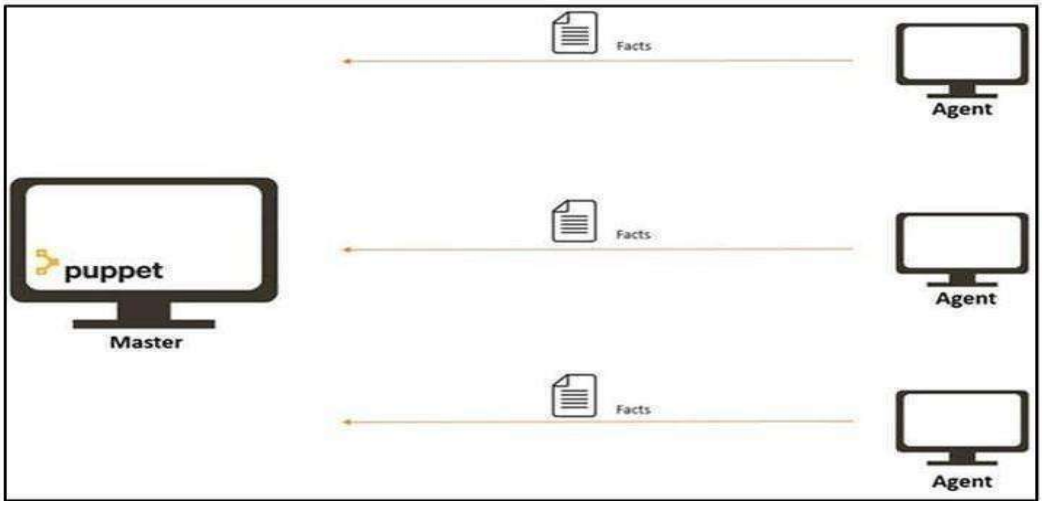
Example: Master – Agent Setup:

- **The Master:** A Linux-based machine with Puppet master software installed on it. It is responsible for maintaining configurations in the form of Puppet codes. The master node can only be Linux.
- **The Agents:** The target machines managed by Puppet with the Puppet agent software installed on them. The agent can be configured on any supported operating system such as Linux, Windows, Solaris, or Mac OS. The communication between master and agent is established through secure certificates.

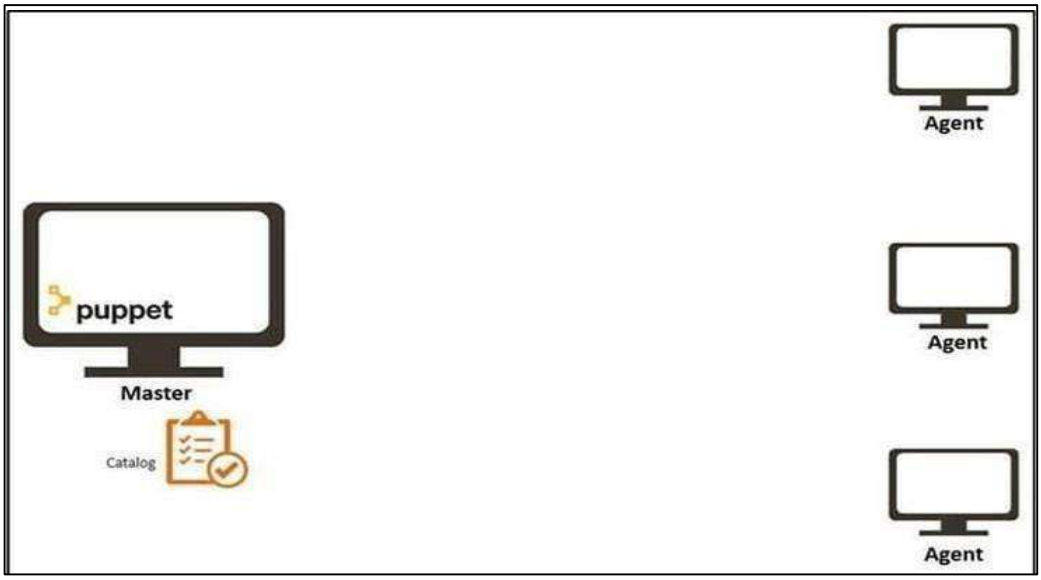


Communication between the Master and the Agent:

1. Once the connectivity is established between the agent and the master, the Puppet agent sends the data about its state to the Puppet master server. These are called Facts: This information includes the hostname, kernel details, IP address, file name details, etc.

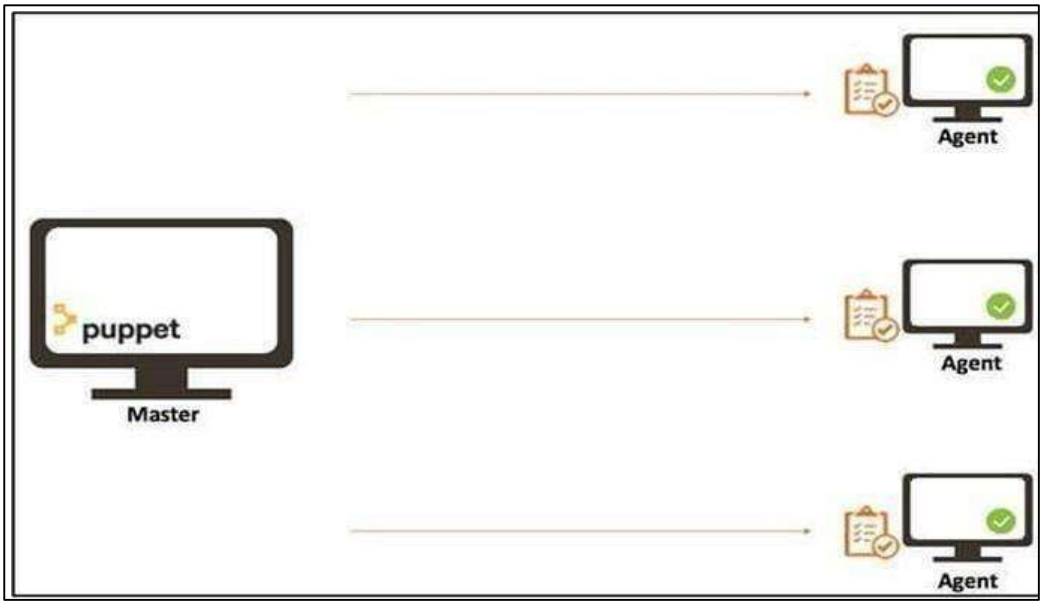


2. Puppet Master uses this data and compiles a list with the configuration to be applied to the agent. This list of configurations to be performed on an agent is known as a catalog. This could involve changes such as package installation, upgrades or removals, File System creation, user creation or deletion, server reboot, IP configuration changes, etc.



3. The agent uses this list of configurations to apply any required configuration changes on the node. If there are no drifts in the configuration, the agent does

not perform any configuration changes and leaves the node to run with the same configuration.

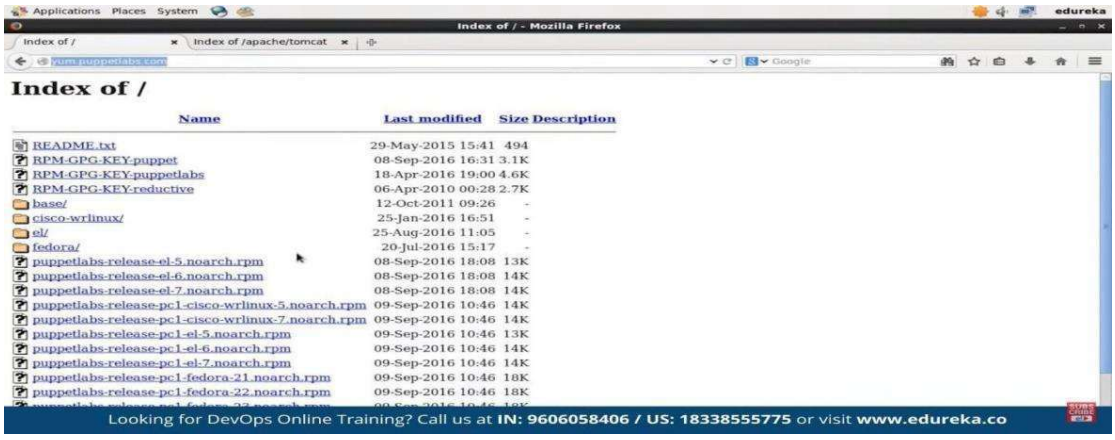


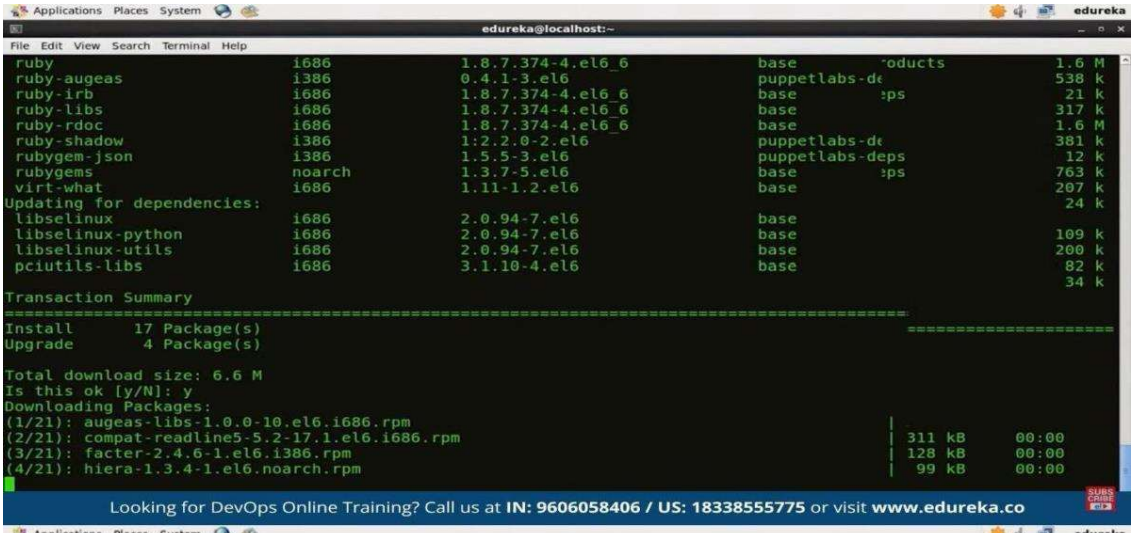
4. Once it is done, the node reports back to Puppet master indicating that the configuration has been applied and completed.

Installation of Puppet on master and agent and initial configuration:

- **Initial configuration on Puppet Master:** Install Puppet software with apt install puppet master -y command on the master.
- **On Agent:** Install with apt install puppet -y command.
- **Exchanging certificates:** Signing certificate from master.

OUTPUT




Applications Places System
edureka
edureka@localhost:~
File Edit View Search Terminal Help
ruby i686 1.8.7.374-4.el6_6 base oducts 1.6 M
ruby-augeas i386 0.4.1-3.el6 puppetlabs-d 538 k
ruby-irb i686 1.8.7.374-4.el6_6 base ps 21 k
ruby-libs i686 1.8.7.374-4.el6_6 base 317 k
ruby-rdoc i686 1.8.7.374-4.el6_6 base 1.6 M
ruby-shadow i386 1:2.2.0-2.el6 puppetlabs-d 381 k
rubygem-json i386 1.5.5-3.el6 puppetlabs-deps 12 k
rubygems noarch 1.3.7-5.el6 base ps 763 k
virt-what i686 1.11-1.2.el6 base 207 k
Updating for dependencies: 24 k
libselinux i686 2.0.94-7.el6 base
libselinux-python i686 2.0.94-7.el6 base 109 k
libselinux-utils i686 2.0.94-7.el6 base 200 k
pciutils-libs i686 3.1.10-4.el6 base 82 k
34 k
Transaction Summary
Install 17 Package(s)
Upgrade 4 Package(s)
Total download size: 6.6 M
Is this ok [y/N]: y
Downloading Packages:
(1/21): augeas-libs-1.0.0-10.el6.i686.rpm
(2/21): compat-readline5-5.2-17.1.el6.i686.rpm | 311 kB 00:00
(3/21): facter-2.4.6-1.el6.i386.rpm | 128 kB 00:00
(4/21): hiera-1.3.4-1.el6.noarch.rpm | 99 kB 00:00
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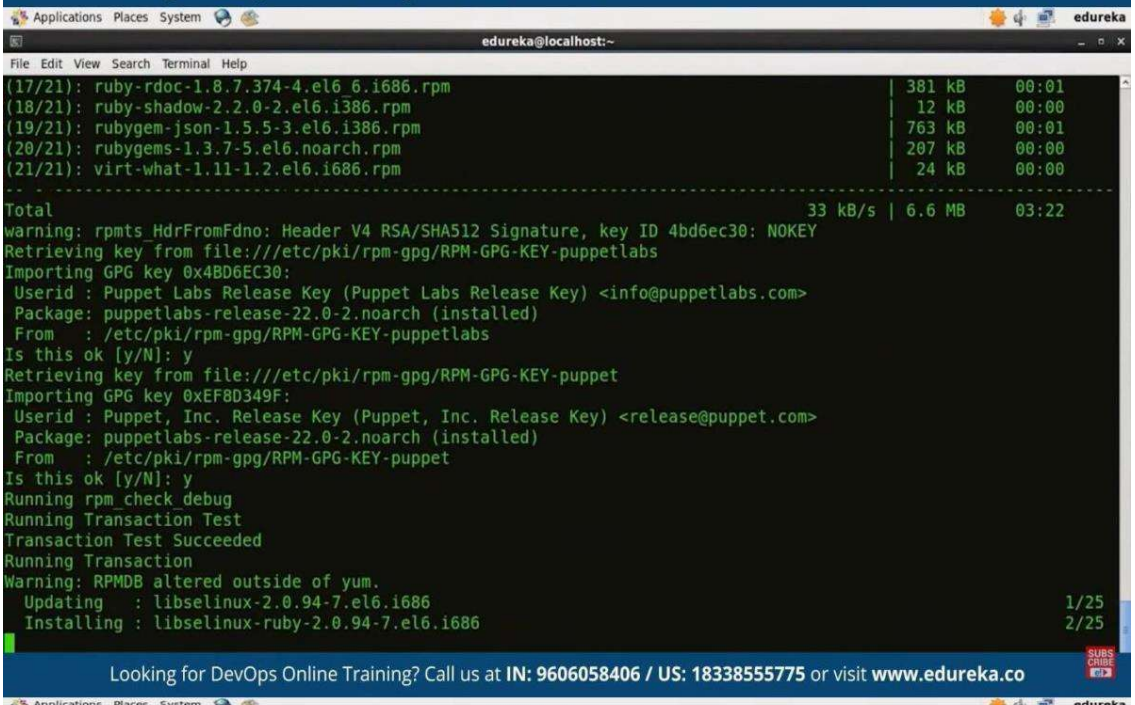
Applications Places System
edureka
edureka@localhost:~
File Edit View Search Terminal Help
(17/21): ruby-rdoc-1.8.7.374-4.el6_6.i686.rpm | 381 kB 00:01
(18/21): ruby-shadow-2.2.0-2.el6.i386.rpm | 12 kB 00:00
(19/21): rubygem-json-1.5.5-3.el6.i386.rpm | 763 kB 00:01
(20/21): rubygems-1.3.7-5.el6.noarch.rpm | 207 kB 00:00
(21/21): virt-what-1.11-1.2.el6.i686.rpm | 24 kB 00:00
Total 33 kB/s | 6.6 MB 03:22
warning: rpmts_HdrFromFdno: Header V4 RSA/SHA512 Signature, key ID 4bd6ec30: NOKEY
Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-puppetlabs
Importing GPG key 0x4BD6EC30:
Userid : Puppet Labs Release Key (Puppet Labs Release Key) <info@puppetlabs.com>
Package: puppetlabs-release-22.0-2.noarch (installed)
From : /etc/pki/rpm-gpg/RPM-GPG-KEY-puppetlabs
Is this ok [y/N]: y
Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-puppet
Importing GPG key 0xEF8D349F:
Userid : Puppet, Inc. Release Key (Puppet, Inc. Release Key) <release@puppet.com>
Package: puppetlabs-release-22.0-2.noarch (installed)
From : /etc/pki/rpm-gpg/RPM-GPG-KEY-puppet
Is this ok [y/N]: y
Running rpm_check_debug
Running Transaction Test
Transaction Test Succeeded
Running Transaction
Warning: RPMDB altered outside of yum.
Updating : libselinux-2.0.94-7.el6.i686 1/25
Installing : libselinux-ruby-2.0.94-7.el6.i686 2/25
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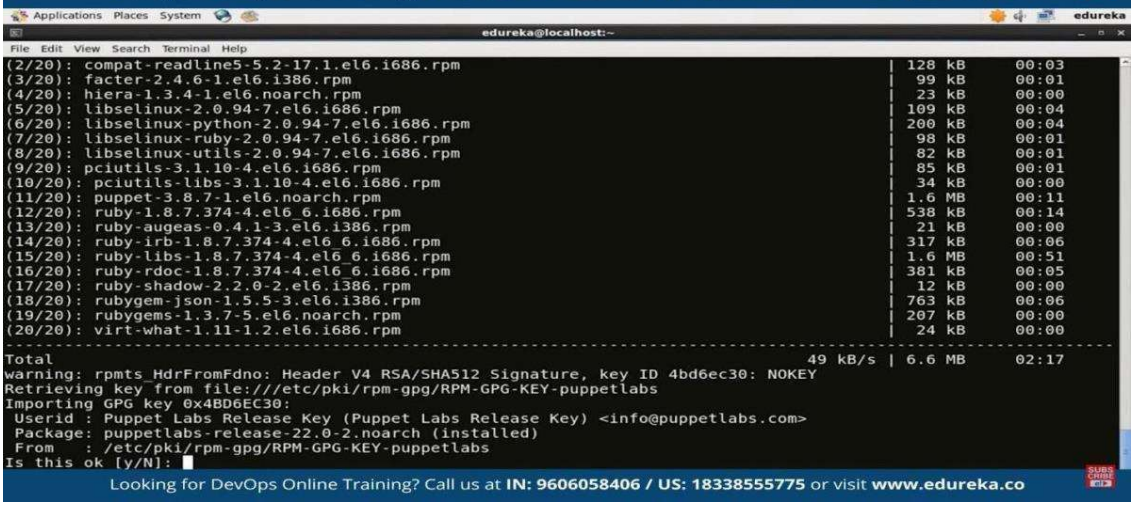
Applications Places System
edureka
edureka@localhost:~
File Edit View Search Terminal Help
(2/20): compat-readline5-5.2-17.1.el6.i686.rpm | 128 kB 00:03
(3/20): facter-2.4.6-1.el6.i386.rpm | 99 kB 00:01
(4/20): hiera-1.3.4-1.el6.noarch.rpm | 23 kB 00:00
(5/20): libselinux-2.0.94-7.el6.i686.rpm | 109 kB 00:04
(6/20): libselinux-python-2.0.94-7.el6.i686.rpm | 200 kB 00:04
(7/20): libselinux-ruby-2.0.94-7.el6.i686.rpm | 98 kB 00:01
(8/20): libselinux-utils-2.0.94-7.el6.i686.rpm | 82 kB 00:01
(9/20): pciutils-3.1.10-4.el6.i686.rpm | 85 kB 00:01
(10/20): pciutils-libs-3.1.10-4.el6.i686.rpm | 34 kB 00:00
(11/20): puppet-3.8.7-1.el6.noarch.rpm | 1.6 MB 00:11
(12/20): ruby-1.8.7.374-4.el6_6.i686.rpm | 538 kB 00:14
(13/20): ruby-augeas-0.4.1-3.el6.i386.rpm | 21 kB 00:00
(14/20): ruby-irb-1.8.7.374-4.el6_6.i686.rpm | 317 kB 00:06
(15/20): ruby-libs-1.8.7.374-4.el6_6.i686.rpm | 1.6 MB 00:51
(16/20): ruby-rdoc-1.8.7.374-4.el6_6.i686.rpm | 381 kB 00:05
(17/20): ruby-shadow-2.2.0-2.el6.i386.rpm | 12 kB 00:00
(18/20): rubygem-json-1.5.5-3.el6.i386.rpm | 763 kB 00:06
(19/20): rubygems-1.3.7-5.el6.noarch.rpm | 207 kB 00:00
(20/20): virt-what-1.11-1.2.el6.i686.rpm | 24 kB 00:00
Total 49 kB/s | 6.6 MB 02:17
warning: rpmts_HdrFromFdno: Header V4 RSA/SHA512 Signature, key ID 4bd6ec30: NOKEY
Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-puppetlabs
Importing GPG key 0x4BD6EC30:
Userid : Puppet Labs Release Key (Puppet Labs Release Key) <info@puppetlabs.com>
Package: puppetlabs-release-22.0-2.noarch (installed)
From : /etc/pki/rpm-gpg/RPM-GPG-KEY-puppetlabs
Is this ok [y/N]:
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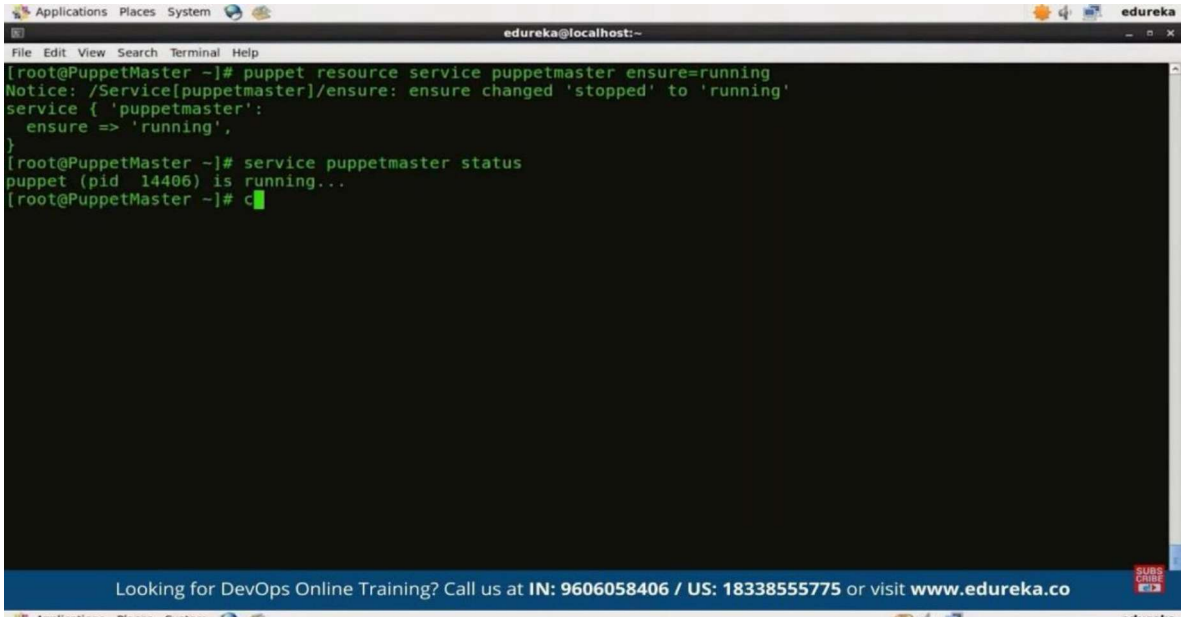
Applications Places System
edureka
edureka@localhost:~
File Edit View Search Terminal Help
[root@PuppetMaster ~]# puppet resource service puppetmaster ensure=running
Notice: /Service[puppetmaster]/ensure: ensure changed 'stopped' to 'running'
service { 'puppetmaster':
ensure => 'running',
}
[root@PuppetMaster ~]# service puppetmaster status
puppet (pid 14406) is running...
[root@PuppetMaster ~]# c
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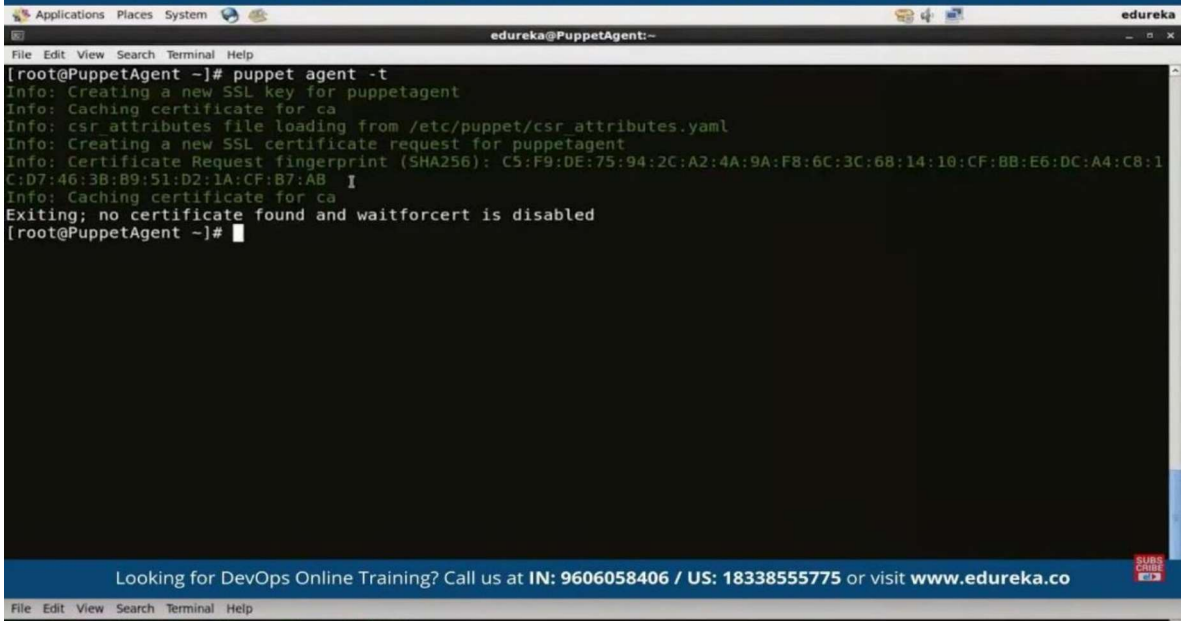
Applications Places System
edureka
edureka@PuppetAgent:~
File Edit View Search Terminal Help
[root@PuppetAgent ~]# puppet agent -t
Info: Creating a new SSL key for puppetagent
Info: Caching certificate for ca
Info: csr_attributes file loading from /etc/puppet/csr_attributes.yaml
Info: Creating a new SSL certificate request for puppetagent
Info: Certificate Request fingerprint (SHA256): C5:F9:DE:75:94:2C:A2:4A:9A:F8:6C:3C:68:14:10:CF:BB:E6:DC:A4:C8:1C:D7:46:3B:B9:51:D2:1A:CF:B7:AB
Info: Caching certificate for ca
Exiting; no certificate found and waitforcert is disabled
[root@PuppetAgent ~]#
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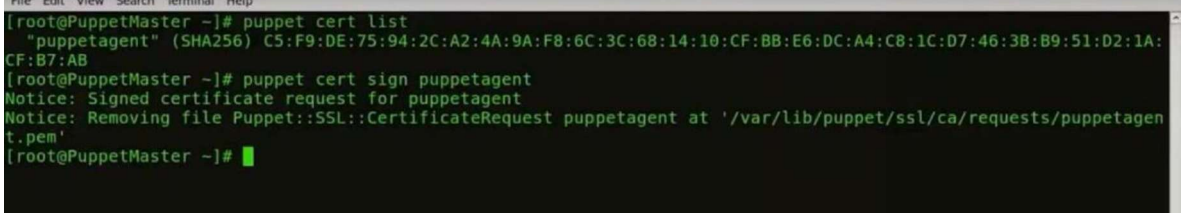
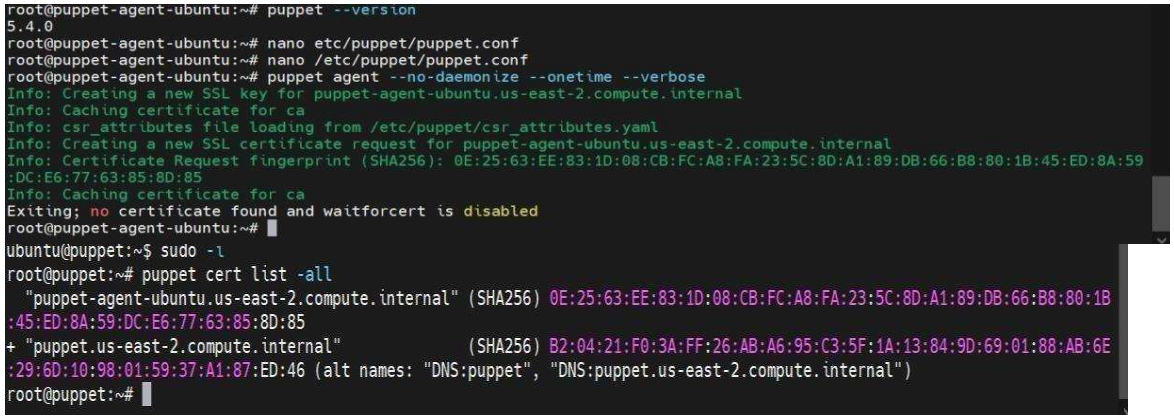
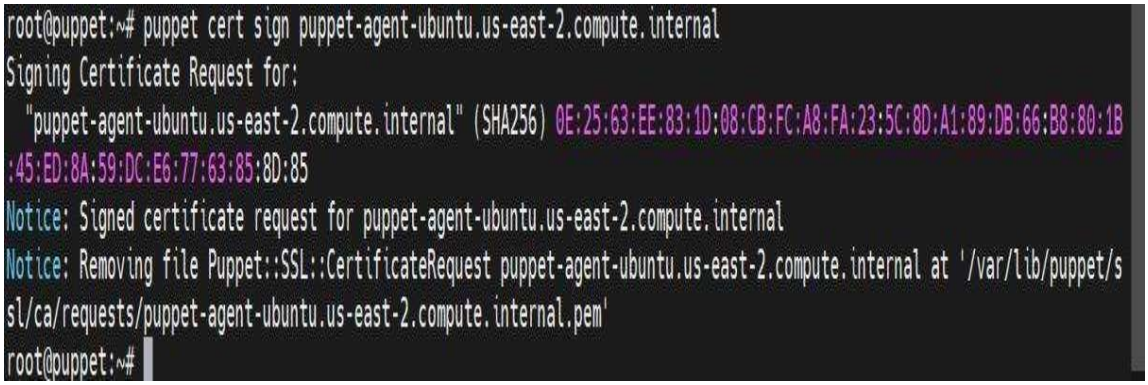

File Edit View Search Terminal Help
[root@PuppetMaster ~]# puppet cert list
"puppetagent" (SHA256) C5:F9:DE:75:94:2C:A2:4A:9A:F8:6C:3C:68:14:10:CF:BB:E6:DC:A4:C8:1C:D7:46:3B:B9:51:D2:1A:CF:B7:AB
[root@PuppetMaster ~]# puppet cert sign puppetagent
Notice: Signed certificate request for puppetagent
Notice: Removing file Puppet::SSL::CertificateRequest puppetagent at '/var/lib/puppet/ssl/ca/requests/puppetagent.pem'
[root@PuppetMaster ~]#


root@puppet-agent-ubuntu:~# puppet --version
5.4.0
root@puppet-agent-ubuntu:~# nano etc/puppet/puppet.conf
root@puppet-agent-ubuntu:~# nano /etc/puppet/puppet.conf
root@puppet-agent-ubuntu:~# puppet agent --no-daemonize --onetime --verbose
Info: Creating a new SSL key for puppet-agent-ubuntu.us-east-2.compute.internal
Info: Caching certificate for ca
Info: csr_attributes file loading from /etc/puppet/csr_attributes.yaml
Info: Creating a new SSL certificate request for puppet-agent-ubuntu.us-east-2.compute.internal
Info: Certificate Request fingerprint (SHA256): 0E:25:63:EE:83:1D:08:CB:FC:A8:FA:23:5C:8D:A1:89:DB:66:B8:80:1B:45:ED:8A:59:DC:E6:77:63:85:8D:85
Info: Caching certificate for ca
Exiting; no certificate found and waitforcert is disabled
root@puppet-agent-ubuntu:~#
ubuntu@puppet:~$ sudo -i
root@puppet:~# puppet cert list -all
"puppet-agent-ubuntu.us-east-2.compute.internal" (SHA256) 0E:25:63:EE:83:1D:08:CB:FC:A8:FA:23:5C:8D:A1:89:DB:66:B8:80:1B:45:ED:8A:59:DC:E6:77:63:85:8D:85
+ "puppet.us-east-2.compute.internal" (SHA256) B2:04:21:F0:3A:FF:26:AB:A6:95:C3:5F:1A:13:84:9D:69:01:88:AB:6E:29:6D:10:98:01:59:37:A1:87:ED:46 (alt names: "DNS:puppet", "DNS:puppet.us-east-2.compute.internal")
root@puppet:~#

Signing certificate from master



CONCLUSION:

Hence, installing and configuring pull-based software configuration management and provisioning tools using Puppet facilitated efficient configuration management and automation.