

## Operating Systems Lab System Administration Lab Task 5

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Section B

### Screenshots:

Creating a Puppet-Master container:

```
momina@death-eater:~$ sudo docker run --name puppet-master -it ubuntu  
root@c656961bb37d:/# _
```

Starting service and opening container in bash mode:

```
momina@death-eater:~$ sudo docker start puppet-master  
puppet-master  
momina@death-eater:~$ sudo docker exec -it puppet-master bash  
root@c656961bb37d:/# _
```

Updating repositories:

```
root@c656961bb37d:/# apt update  
Get:1 http://archive.ubuntu.com/ubuntu focal InRelease [265 kB]  
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [107 kB]  
Get:3 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [10.4 kB]  
Get:4 http://archive.ubuntu.com/ubuntu focal-updates InRelease [107 kB]  
Get:5 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [1079 B]  
Get:6 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [4673 B]  
Get:7 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [65.9 kB]  
Get:8 http://archive.ubuntu.com/ubuntu focal-backports InRelease [98.3 kB]  
Get:9 http://archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [177 kB]  
Get:10 http://archive.ubuntu.com/ubuntu focal/restricted amd64 Packages [33.4 kB]  
Get:11 http://archive.ubuntu.com/ubuntu focal/main amd64 Packages [1275 kB]  
Get:12 http://archive.ubuntu.com/ubuntu focal/universe amd64 Packages [11.3 MB]  
51% [12 Packages 3753 kB/11.3 MB 33%]
```

Upgrading packages:

```
root@c656961bb37d:/# apt upgrade -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
  apt libapt-pkg6.0
2 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 2122 kB of archives.
After this operation, 6144 B disk space will be freed.
Get:1 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 libapt
```

Installing useful tools:

```
root@c656961bb37d:/# apt install inetutils-ping net-tools vim wget -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  alsa-topology-conf alsa-ucm-conf ca-certificates file libasound2 libasound2-d
  libexpat1 libgpm2 libidn11 libltdl7 libmagic-mgc libmagic1 libmpdec2 libogg0
  libpython3.8-minimal libpython3.8-stdlib libreadline8 libsqlite3-0 libssl1.1
  libvorbisfile3 mime-support netbase openssl publicsuffix readline-common sou
  vim-common vim-runtime xxd xz-utils
Suggested packages:
  libasound2-plugins alsa-utils libcanberra-gtk0 libcanberra-pulse gpm readline
```

Installing repository of puppet so ubuntu gets puppet's metadata which will be used to install puppet later:

```
root@c656961bb37d:/# wget https://apt.puppetlabs.com/puppet6-release-bionic.deb
--2020-05-16 09:59:30-- https://apt.puppetlabs.com/puppet6-release-bionic.deb
Resolving apt.puppetlabs.com (apt.puppetlabs.com)... 13.35.183.25, 13.35.183.56, 13.35.183.76, ...
Connecting to apt.puppetlabs.com (apt.puppetlabs.com)[13.35.183.25]:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 11736 (11K) [application/x-debian-package]
Saving to: 'puppet6-release-bionic.deb'

puppet6-release-bionic.de 100%[=====] 11.46K --.-KB/s in 0s

2020-05-16 09:59:31 (94.5 MB/s) - 'puppet6-release-bionic.deb' saved [11736/11736]
```

Installing puppet:

```
root@c656961bb37d:/# dpkg -i puppet6-release-bionic.deb
Selecting previously unselected package puppet6-release.
(Reading database ... 7585 files and directories currently installed.)
Preparing to unpack puppet6-release-bionic.deb ...
Unpacking puppet6-release (6.0.0-8bionic) ...
Setting up puppet6-release (6.0.0-8bionic) ...
root@c656961bb37d:/# _
```

Updating packages again so puppet gets updated as well:

```
root@c656961bb37d:/# apt update
Hit:1 http://archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://security.ubuntu.com/ubuntu focal-security InRelease
Hit:3 http://archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:4 http://archive.ubuntu.com/ubuntu focal-backports InRelease
Get:5 http://apt.puppetlabs.com bionic InRelease [85.4 kB]
Get:6 http://apt.puppetlabs.com bionic/puppet6 amd64 Packages [46.7 kB]
Get:7 http://apt.puppetlabs.com bionic/puppet6 all Packages [19.7 kB]
Fetched 152 kB in 3s (48.9 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
All packages are up to date.
```

Creating image of puppet-master at this point to be used in different agents:

```
momina@death-eater:~$ sudo docker commit puppet-master puppet-6
sha256:b12544d3d7bf893fbc939734266b1cd220322f8d9a93e4f64dbace3ff45f5654
```

```
momina@death-eater:~$ sudo docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
puppet-6	latest	b12544d3d7bf	About a minute ago	171MB
ubuntu-mysql	latest	06f08f4ac3a9	10 days ago	722MB
ubuntu-apache	latest	0478ca480bfa	10 days ago	283MB
ubuntu	latest	1d622ef86b13	3 weeks ago	73.9MB

```
momina@death-eater:~$
```

Installing puppet master/server:

```
momina@death-eater:~$ sudo docker exec -it puppet-master bash
root@c656961bb37d:/# apt install puppetserver
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ca-certificates-java dbus fontconfig-config fonts-dejavu-core java-common krb5-
  libapparmor1 libavahi-client3 libavahi-common-data libavahi-common3 libbsd0 lib
  libfontconfig1 libfreetype6 libgssapi-krb5-2 libjpeg-turbo8 libjpeg8 libk5crypt
  libkrb5-3 libkrb5support0 liblcms2-2 libnspr4 libnss3 libpcsc-lite1 libpng16-16
  libx11-data libxau6 libxcb1 libxdmcp6 libxext6 libxi6 libxrender1 libxtst6 open
  puppet-agent ucf x11-common
Suggested packages:
```

Modify puppetserver file to decrease memory allocation:

```
root@c656961bb37d:/# vi /etc/default/puppetserver
root@c656961bb37d:/#
```

```
#####
# Init settings for puppetserver
#####

# Location of your Java binary (version 8)
JAVA_BIN="/usr/bin/java"

# Modify this if you'd like to change the memory allocation, enable JMX, etc
JAVA_ARGS="-Xms64m -Xmx512m -Djruby.logger.class=com.puppetlabs.jruby_utils.jruby.Slf4jLogger"

# Modify this as you would JAVA_ARGS but for non-service related subcommands
JAVA_ARGS_CLI="${JAVA_ARGS_CLI:-}"

# Modify this if you'd like TrapperKeeper specific arguments
TK_ARGS=""

# These normally shouldn't need to be edited if using OS packages
USER="puppet"
GROUP="puppet"
INSTALL_DIR="/opt/puppetlabs/server/apps/puppetserver"
CONFIG="/etc/puppetlabs/puppetserver/conf.d"
```

Setting up CA ourselves and starting puppetserver service:

```
root@c656961bb37d:/# /opt/puppetlabs/bin/puppetserver ca setup
Generation succeeded. Find your files in /etc/puppetlabs/puppet/ssl/ca
root@c656961bb37d:/# vi /etc/puppetlabs/puppet/ssl/ca
root@c656961bb37d:/# service puppetserver start
```

Ensuring puppet is listening on port 8140:

```
root@c656961bb37d:/# netstat -ntulp
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 0.0.0.0:8140             0.0.0.0:*               LISTEN      -
root@c656961bb37d:/# _
```

Modifying bashrc file:

```
root@c656961bb37d:/# vi ~/.bashrc
root@c656961bb37d:/# _
```

```
PATH=$PATH:/opt/puppetlabs/bin
```

Running bashrc file and checking path of search:

```
root@c656961bb37d:/# source ~/.bashrc
root@c656961bb37d:/# puppet
See 'puppet help' for help on available puppet subcommands
root@c656961bb37d:/# puppet --version
6.15.0
root@c656961bb37d:/# echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/opt/puppetlabs/bin
root@c656961bb37d:/# _
```



Checking user resource in puppet:

```
root@c656961bb37d:/# puppet resource user
user { '_apt':
  ensure      => 'present',
  gid         => 65534,
  home        => '/nonexistent',
  password    => '*',
  password_max_age => 99999,
  password_min_age  => 0,
  password_warn_days => 7,
  provider    => 'useradd',
  shell       => '/usr/sbin/nologin',
  uid         => 100,
}
user { 'backup':
  ensure      => 'present',
  comment     => 'backup',
  gid         => 34,
  home        => '/var/backups',
  password    => '*',
  password_max_age => 99999,
  password_min_age  => 0,
  password_warn_days => 7,
  provider    => 'useradd',
  shell       => '/usr/sbin/nologin',
}
```

Checking packages in puppet:

```
root@c656961bb37d:/# puppet resource package
package { 'adduser':
  ensure      => '3.118ubuntu2',
  provider    => 'apt',
}
package { 'alsa-topology-conf':
  ensure      => '1.2.2-1',
  provider    => 'apt',
}
package { 'alsa-ucm-conf':
  ensure      => '1.2.2-1',
  provider    => 'apt',
}
package { 'apt':
  ensure      => '2.0.2ubuntu0.1',
  provider    => 'apt',
}
```

Checking hosts in puppet:

```
root@c656961bb37d:/# puppet resource host
host { 'c656961bb37d':
  ensure => 'present',
  ip      => '172.17.0.2',
  provider => 'parsed',
  target  => '/etc/hosts',
}
host { 'ip6-allnodes':
  ensure => 'present',
  ip      => 'ff02::1',
  provider => 'parsed',
  target  => '/etc/hosts',
}
host { 'ip6-allrouters':
  ensure => 'present',
  ip      => 'ff02::2',
  provider => 'parsed',
  target  => '/etc/hosts',
}
```

To check hostname and Fully Qualified Domain Name (fqdn):

```
root@c656961bb37d:/# facter -p | grep hostname
2020-05-16 10:41:52.207022 WARN puppetlabs.facter - skipping external facts for "/opt/puppetlabs/puppet
et/cache/facts.d": No such file or directory
/etc/hostname => {
  hostname => "c656961bb37d",
  mount => "/etc/hostname",
}
root@c656961bb37d:/# hostname
c656961bb37d
root@c656961bb37d:/# facter -p | grep fqdn
2020-05-16 10:42:20.438991 WARN puppetlabs.facter - skipping external facts for "/opt/puppetlabs/puppet
et/cache/facts.d": No such file or directory
fqdn => "c656961bb37d.Home",
```

Creating a .pp file writing puppet code in:

```
root@c656961bb37d:/tmp# vi test01.pp_
```

```
file { ['/tmp/config-example':
  ensure => 'file',
  mode   => '0664',
  owner  => 'root',
  group  => 'root',
  content => "Hello World \n",
}
```

Applying .pp file so that code in that file executes:

When you make some changes in .pp file and want to reflect them then you have to apply .pp again

```
root@c656961bb37d:/tmp# puppet apply test01.pp
Notice: Compiled catalog for c656961bb37d.home in environment production in 0.01 seconds
Notice: /Stage[main]/Main/File[/tmp/config-example]/ensure: defined content as '{md5}9267511a22ee72ad81ec3e0c674b115e'
Notice: Applied catalog in 0.06 seconds
root@c656961bb37d:/tmp# ls
config-example  hsperfdata_puppet  hsperfdata_root  jruby-5304  test01.pp
root@c656961bb37d:/tmp# ls -lh
total 20K
-rw-rw-r-- 1 root  root    13 May 16 10:51 config-example
drwxr-x--- 2 puppet puppet 4.0K May 16 10:28 hsperfdata_puppet
drwxr-xr-x 2 root  root   4.0K May 16 10:21 hsperfdata_root
drwxr-x--- 2 puppet puppet 4.0K May 16 10:29 jruby-5304
-rw-r--r-- 1 root  root  149 May 16 10:49 test01.pp
root@c656961bb37d:/tmp# cat config-example
Hello World
```

Modified .pp file:

```
file { '/tmp/config-example':
  ensure => 'file',
  mode   => '0644',
  owner  => 'root',
  group  => 'root',
  content => "Hello ${hostname} \n"
}
```

```
root@c656961bb37d:/tmp# puppet apply test01.pp
Notice: Compiled catalog for c656961bb37d.home in environment production in 0.01 seconds
Notice: /Stage[main]/Main/File[/tmp/config-example]/content: content changed '{md5}9267511a22ee72ad81ec3e0c674b115e' to '{md5}220a002e9e8f76b9243fec8bbcf16629'
Notice: Applied catalog in 0.08 seconds
root@c656961bb37d:/tmp# cat config-example
Hello c656961bb37d
```



Modifying .pp to start apache2:

It requires to install apache2 package first.

```
file { ['/tmp/config-example':  
  ensure => 'file',  
  mode => '0644',  
  owner => 'root',  
  group => 'root',  
  content => "Hello ${hostname} \n",  
}  
  
package{ 'apache2':  
  ensure => 'installed',  
}  
  
service{ 'apache2':  
  ensure => 'running',  
  require => Package['apache2']  
}  
~  
~  
~
```

To check if apache2 is listening:

```
root@c656961bb37d:/tmp# puppet apply test01.pp  
Notice: Compiled catalog for c656961bb37d.home in environment production in 0.63 seconds  
Notice: /Stage[main]/Main/Service[apache2]/ensure: ensure changed 'stopped' to 'running'  
Notice: Applied catalog in 1.20 seconds  
root@c656961bb37d:/tmp# netstat -ntulp  
Active Internet connections (only servers)  
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name  
tcp        0      0 0.0.0.0:8140             0.0.0.0:*               LISTEN      -  
tcp        0      0 0.0.0.0:80               0.0.0.0:*               LISTEN      6316/apache2  
root@c656961bb37d:/tmp# _
```

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