perfSONAR-on-stick Installation and Customization Guide

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# Introduction

perfSONAR-on-stick is a portable USB flash drive intended to simplify deployment of perfSONAR measurement points (MPs). It is based on the CentOS 6.6 operating system and contains all the measurement components of perfSONAR – BWCTL-MP, OWAMP-MP and a HADES MP. BWCTL-MP and OWAMP-MP are fully functional and ready to receive measurement requests out of the box. The HADES MP has the necessary packages and dependencies installed; however it still requires the configuration files to be pushed from the central server before it will operate.

This document describes the procedures for:

* performing an installation from publicly available components
* applying customizations, updating the OS and software components
* preparing the stick for delivery
* reproducing the stick

# Installation

## Preparation

Disconnect or disable any storage devices connected to the machine on which the installation will be performed, except the DVD drive. If the machine has 2 or more network interfaces – leave only one of them enabled.

## OS installation

Boot the CentOS installation media and accept the defaults, except where stated below:

### Root password

Unless required otherwise, use *perfsonar* for root password. SSH access is restricted by default and users are adviced to change the password before enabling it.

### Partitioning setup

Choose “*Create a custom partitioning layout*”, remove all LVM volumes and partitions suggested by the installer and create the following partitions:

* /dev/sda1
  + type vfat (FAT32)
  + no mount point
  + size - min. 200 MB
  + Select “Force to be a primary partition”
* /dev/sda2
  + type ext4
  + mount point: /
  + size – min 3 GB (at least 3.5 GB recommended)

The ext4 partition will hold the operating system and packages. The FAT32 partition will be used to store the documentation, marketing materials, branding, etc. The total size of both partitions must be no more than actual size of the smallest USB stick that will be used for deployment. USB sticks can vary in actual size, even if they have identical marketed capacity.

The FAT32 partition must be the first entry in the partition table, as Windows will ignore any partitions other than the first one on a removable flash drive.

Do not use LVM. Do not create a separate */boot* partition. The installer will automatically move it to the first position in the partition table, which would cause the issue mentioned above.

Do not create a swap partition as it might cause the drive to fail quickly because of the erase cycle limit.

In case there are additional storage devices connected, make sure the boot loader is not installed on one of them.

### Package selection

1. Select the “*Basic Server*” package set.
2. Select “*Customize Later*”

# OS post-installation setup

## Secure SSH

Restrict access to SSH to the authorised hosts that will be used to configure the stick.

*/etc/hosts.allow*

sshd: 172.16.0.1

*/etc/hosts.deny*

sshd: ALL

## Disable unneeded services

Run the following command to disable services that are not needed for perfSONAR operation.

chkconfig abrt-ccpp off

chkconfig abrtd off

chkconfig abrt-oops off

chkconfig acpid off

chkconfig atd off

chkconfig autofs off

chkconfig certmonger off

chkconfig cpuspeed off

chkconfig cups off

chkconfig haldaemon off

chkconfig kdump off

chkconfig lvm2-monitor off

chkconfig mdmonitor off

chkconfig messagebus off

chkconfig microcode\_ctl off

chkconfig netfs off

chkconfig nfslock off

chkconfig portreserve off

chkconfig rpcbind off

chkconfig rpcgssd off

chkconfig rpcidmapd off

chkconfig smartd off

## Minimize disk activity

Unless the USB sticks that are used are known to support wear leveling in hardware, there is a risk that continuous disk activity in certain blocks might cause the drive to fail prematurely because of the erase cycle limit. The changes listed below prevent recurring operations in the filesystem by system components that are not essential for running a perfSONAR MP.

* Remove unneeded packages:

yum remove psacct mlocate readahead audit sysstat mcelog prelink

* In the */etc/fstab* file, add the **noatime** mount option for the root filesystem.
* In the */etc/rsyslog.conf* file, comment the line starting with **cron.\***
* In the */etc/man.config* file, add or uncomment the following line:

MAKEWHATISDBUPDATES n

* In the */etc/ntp.conf* file, remove or comment the **driftfile** directive

## Firewall setup

Put the following content into */etc/sysconfig/iptables* :

\*filter

:INPUT ACCEPT [0:0]

:FORWARD ACCEPT [0:0]

:OUTPUT ACCEPT [0:0]

-A INPUT -m state --state ESTABLISHED,RELATED -j ACCEPT

-A INPUT -p icmp -j ACCEPT

-A INPUT -i lo -j ACCEPT

-A INPUT -m state --state NEW -m tcp -p tcp --dport 22 -j ACCEPT

-A INPUT -m state --state NEW -m tcp -p tcp --dport 8080 -j ACCEPT

-A INPUT -m state --state NEW -m tcp -p tcp --dport 8090 -j ACCEPT

-A INPUT -m state --state NEW -m tcp -p tcp --dport 4823 -j ACCEPT

-A INPUT -m state --state NEW -m tcp -p tcp --dport 56000:56999 -j ACCEPT

-A INPUT -m state --state NEW -m tcp -p tcp --dport 6000:6999 -j ACCEPT

-A INPUT -m state --state NEW -m udp -p udp --dport 6000:6999 -j ACCEPT

-A INPUT -m state --state NEW -m tcp -p tcp --dport 861 -j ACCEPT

-A INPUT -m state --state NEW -m udp -p udp --dport 7000:7999 -j ACCEPT

-A INPUT -m state --state NEW -m udp -p udp --dport 60000:61000 -j ACCEPT

-A INPUT -j REJECT --reject-with icmp-host-prohibited

-A FORWARD -j REJECT --reject-with icmp-host-prohibited

COMMIT

Then reload iptables rules via the init script:

service iptables reload

## PerfSONAR components

Install the EPEL, Internet2 and PerfSONAR repositories.

Install and configure the required PerfSONAR MP components (oppd, bwctl, owamp, etc.) as per the PerfSONAR documentation.

Make the following changes to the PerfSONAR configuration files:

*/etc/bwctld/bwctld.conf*

peer\_port 56000-56999

iperf\_port 6000-6999

allow\_unsync

disable\_nuttcp

*/etc/owampd/owampd.conf*

testports 7000-7999

If tomcat and PerfSONAR UI are installed, add the following to the JAVA\_OPTS section in the */etc/tomcat6/tomcat6.conf* file:

-XX:-UsePerfData

## PerfSONAR USB setup components and requirements

Download the following file and extract it to the / directory:

wget ftp://ftp.uni-ruse.bg/perfsonar-on-stick/perfsonar-mp-setup.tar.gz

tar -xzvf perfsonar-mp-setup.tar.gz -C /

rm -f perfsonar-mp-setup.tar.gz

Install the dialog and pv packages:

yum install pv dialog

For a USB stick add the following line to the /etc/sysconfig/perfsonar-mp-setup file (create the file first if necessary):

USB=yes

This will enable the “Transfer to installation to HDD” option, that would otherwise be hidden.

Add the following line to the /etc/rc.local file:

openvt -sw /usr/local/bin/perfsonar-mp-setup

## Other

Edit the */etc/grub.conf* file and remove the following entries from each kernel line:

rhgb quiet

Optionally add the following at the end of the */etc/issue* file.

PerfSONAR on stick

http://www.perfsonar.net/

PerfSONAR MP service URLs:

BWCTL MP: http://\n:8090/services/MP/BWCTL

OWAMP MP: http://\n:8090/services/MP/OWAMP

# Applying customizations or updates to the OS and software components

Perform the following steps to perform updates or make modifications to the perfSONAR stick

1. Boot a stick freshly imaged with the previous version

NOTE: In order to boot from USB in a virtual machine, the Plop Boot Manager can be used.

* <http://www.plop.at/en/bootmanager/index.html>

1. Configure networking via the *system-config-network* tool or by editing directly the network interface configuration files.
2. Edit the */etc/hosts.allow* to allow SSH access from the host that will be used to login remotely. The directly attached console can be used, but the commands in the next section will have to be typed manually.
3. Login remotely and perform the required modification or updates.

NOTE: Due to the low write speed of the flash-based drives, *yum* operations can be noticeably slower than usual.

1. Prepare the stick for delivery as described in the next section.

# Preparing the stick for delivery

Before delivering the stick to the user, the following steps must be taken.

Clean cache and log files:

yum clean all

cd /var/log

rm -f anaconda\* audit/\* bacula/\* boot.log\* cron\* dmesg\*

rm -f maillog\* mcelog messages\* secure\* spooler\*

rm -f tallylog tomcat6/\* yum.log\*

rm -rf /var/cache/tomcat6/work/

Remove network and hostname settings:

sed -e "/HOSTNAME=/d" -i /etc/sysconfig/network

sed -e "/GATEWAY=/d" -i /etc/sysconfig/network

sed -e "/IPADDR/d" -i /etc/sysconfig/network-scripts/ifcfg-eth0

sed -e "/NETMASK/d" -i /etc/sysconfig/network-scripts/ifcfg-eth0

sed -e "/GATEWAY/d" -i /etc/sysconfig/network-scripts/ifcfg-eth0

sed -e "/HWADDR/d" -i /etc/sysconfig/network-scripts/ifcfg-eth0

sed -e "/DNS1/d" -i /etc/sysconfig/network-scripts/ifcfg-eth0

sed -e "/DNS2/d" -i /etc/sysconfig/network-scripts/ifcfg-eth0

sed -e "/sshd:/d" -i /etc/hosts.allow

sed -e "/TYPE=Ethernet/d" -i /etc/sysconfig/network-scripts/ifcfg-eth0

cat /dev/null > /etc/resolv.conf

rm -f /etc/sysconfig/network-scripts/route-eth0

Remove SSH keys. New keys will be created automatically at next boot.

rm -f /etc/ssh/ssh\_host\_\*

Remove persistent udev rules for network adapters:

rm -f /etc/udev/rules.d/70-persistent-net.rules

Clear bash history, etc.

history -c

rm -f ~/.bash\_history ~/.viminfo ~/.lesshst

Power off the machine and proceed to cloning the stick:

poweroff

# Reproducing the stick

The stick can be reproduced by creating and restoring a raw image of the USB stick.

On Windows systems, the USB Image Tool can be used to perform these tasks in “Device mode”.

* <http://www.alexpage.de/usb-image-tool/>

On Unix/Linux systems, the Clonezilla utility provides a “device-image” mode, which includes “savedisk” and “restoredisk” operations.

Alternatively, the standard *dd* command can be used.

Creating an image:

dd if=/dev/sdX of=perfsonar-on-stick.img

Restoring an image:

dd if=perfsonar-on-stick.img of=/dev/sdX

where */dev/sdX* is the block device name of the flash drive (/*dev/sda*, */dev/sdb*, */dev/sdc*, etc.)

The destination stick can be smaller than the source, but not smaller than the combined size of the partitions.

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