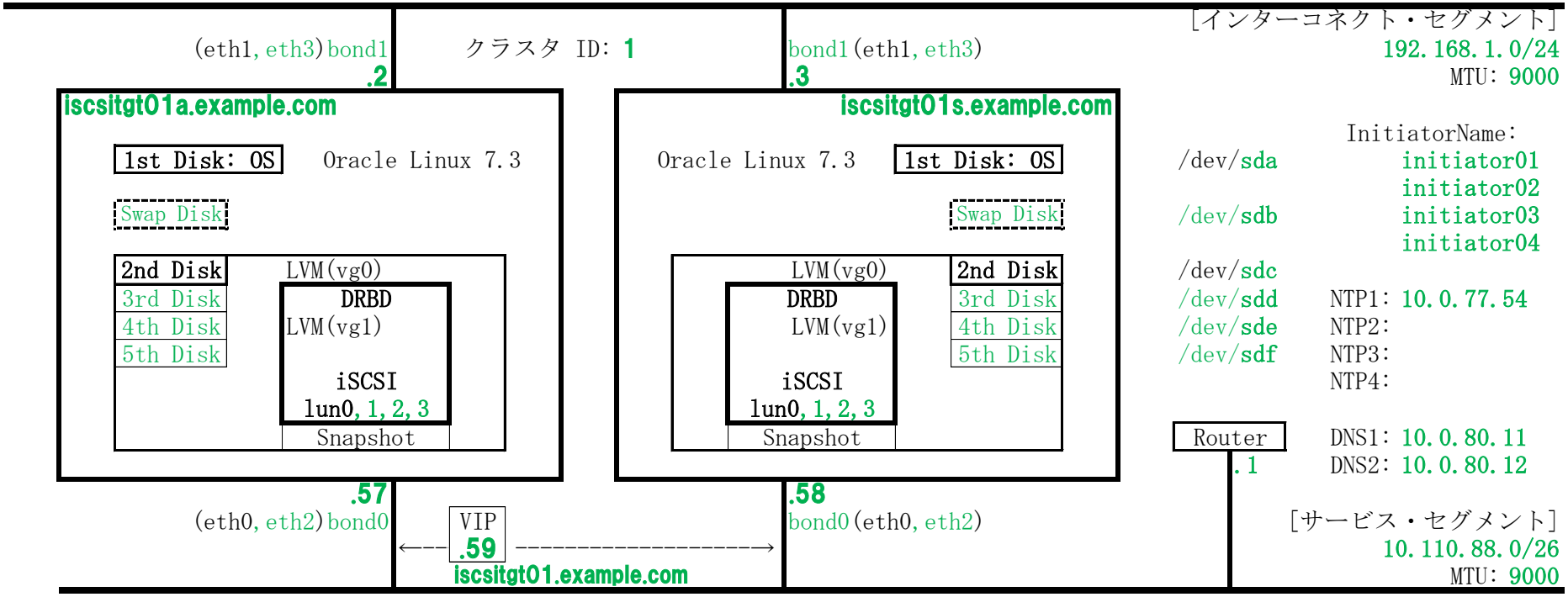
Ver.1.10 2016/11/30

[Check]

【想定するサーバのスペックとネットワーク構成】

CPU: 2Core 以上
Memory: 2GB 以上 ※ この手順書では、 2GB にて例示
DVD ドライブ: 1台
HDD 1: 8GB 以上 (1st Disk, OS 用) ※ この手順書では、 40GB にて例示
HDD 2: 1GB 以上 (swap 用) ※ この手順書では、 1GB にて例示
HDD 3: 1GB 以上 (2nd Disk, データ用) ※ この手順書では、100GB にて例示
HDD 4: 1GB 以上 (3rd Disk, データ用) ※ この手順書では、100GB にて例示
HDD 5: 1GB 以上 (4th Disk, データ用) ※ この手順書では、100GB にて例示
HDD 6: 1GB 以上 (5th Disk, データ用) ※ この手順書では、100GB にて例示
NIC 1: 1Gbps 以上、サービス用セグメント (IBM Bluemix(SoftLayer) では Private VLAN) へ接続
NIC 2: 1Gbps 以上、インターコネクト用セグメント (IBM Bluemix(SoftLayer) では Public VLAN) へ接続
NIC 3: 1Gbps 以上、サービス用セグメント (IBM Bluemix(SoftLayer) では Private VLAN) へ接続
NIC 4: 1Gbps 以上、インターコネクト用セグメント (IBM Bluemix(SoftLayer) では Public VLAN) へ接続



○　※　当文書内で緑色にした部分は、環境に合わせて読み替えたり、カスタマイズ（名前を変えたり、実行するしないを選択）
○　　する部分を表します。ただし、日付や注目していない UUID 等は除きます。

※　IBM Bluemix(SoftLayer) のベアメタルサーバで NIC を冗長化した場合、
　　「NIC 1 (eth0)」と「NIC 3 (eth2)」、「NIC 2 (eth1)」と「NIC 4 (eth3)」が LAG で束ねられています。
※　本手順書では、LAG の設定がない前提としますが、LAG 対応させるための設定方法は注記しておきます。
※　IBM Bluemix(SoftLayer) の仮想サーバは、ベアメタルサーバと比較して、主に以下の相違点があります。
　　・「NIC 3」と「NIC 4」を追加できません。
　　・MTU は 1500 までしかサポートされません。
　　・ローカルストレージのデバイス名が異なります。

○　【共有ストレージの構成】

○　/dev/sdc　　LVM 物理ボリューム
○　/dev/sdd　　LVM 物理ボリューム
○　/dev/sde　　LVM 物理ボリューム
○　/dev/sdf　　LVM 物理ボリューム
○　vg0　　LVM ボリュームグループ
○　/dev/vg0/lv-drbd0　　LVM 論理ボリューム (DRBD 用ブロックデバイスとして使用)
○　/dev/drbd0　　DRBD リソース (LVM 物理ボリュームとして使用)
○　vg1　　DRBD 上のボリュームグループ (「vg」+「クラスタ ID」)
○　/dev/vg1/lv-lun0000　　DRBD 上の LVM 論理ボリューム (LUN としてエクスポート)
○　/dev/vg1/lv-lun0001　　DRBD 上の LVM 論理ボリューム (LUN としてエクスポート)
○　/dev/vg1/lv-lun0002　　DRBD 上の LVM 論理ボリューム (LUN としてエクスポート)
○　/dev/vg1/lv-lun0003　　DRBD 上の LVM 論理ボリューム (LUN としてエクスポート)

○ 【OS のインストールと初期設定】

○ インストーラを DVD ドライブにセットし、サーバを起動します。

a,s
```
# V834394-01.iso (Oracle Linux 7.3)
```

○ インストーラの起動メニューが表示されたら60秒以内に「Tab」キーを押下します。

a,s
```
# Tab
```

○ 起動オプションを以下のように編集し、「Enter」キーを押下します。

a,s
```
# vmlinuz … rd.live.check quiet
# ↓
# vmlinuz … net.ifnames=0 biosdevname=0 selinux=0 vconsole.keymap=jp106
```

※ 英語キーボードとして認識されている状態なので、「=」を入力するには「^」を押下します。

○ anaconda の「Welcome」画面が出てきたら「Ctrl + Alt + F3」キーを押下し、シェルに移行します。

a,s
```
# Ctrl + Alt + F3
[anaconda root@localhost /]#
```

○ HDD の情報を確認します。

a,s
```
fdisk -l | grep ^Disk | sort
Disk /dev/mapper/live-base: 2147 MB, 2147483648 bytes, 4194304 sectors
Disk /dev/mapper/live-rw: 2147 MB, 2147483648 bytes, 4194304 sectors
Disk /dev/sda: 42.9 GB, 17179869184 bytes, 33554432 sectors
Disk /dev/sdb: 1073 MB, 1073741824 bytes, 2097152 sectors
Disk /dev/sdc: 107.4 GB, 107374182400 bytes, 209715200 sectors
Disk /dev/sdd: 107.4 GB, 107374182400 bytes, 209715200 sectors
Disk /dev/sde: 107.4 GB, 107374182400 bytes, 209715200 sectors
Disk /dev/sdf: 107.4 GB, 107374182400 bytes, 209715200 sectors
```

○ パーティションを作成します。

a,s
```
fdisk -H 64 -S 32 /dev/sda
Welcome to fdisk (util-linux 2.23.2).
```

```
1080        Changes will remain in memory only, until you decide to write them.
1090        Be careful before using the write command.
1100
1110        Device does not contain a recognized partition table
1120        Building a new DOS disklabel with disk identifier 0x2a058c02.
1130
1140 a,s    Command (m for help): o
1150        Building a new DOS disklabel with disk identifier 0xc9c2368a.
1160
1170 a,s    Command (m for help): n
1180        Partition type:
1190           p   primary (0 primary, 0 extended, 4 free)
1200           e   extended
1210 a,s    Select (default p): [Enter]
1220        Using default response p
1230 a,s    Partition number (1-4, default 1): [Enter]
1240 a,s    First sector (2048-83886079, default 2048): [Enter]
1250        Using default value 2048
1260 a,s    Last sector, +sectors or +size{K,M,G} (2048-83886079, default 83886079): +500M
1270        Partition 1 of type Linux and of size 500 MiB is set
1280
1290 a,s    Command (m for help): a
1300        Selected partition 1
1310
1320 a,s    Command (m for help): n
1330        Partition type:
1340           p   primary (1 primary, 0 extended, 3 free)
1350           e   extended
1360 a,s    Select (default p): [Enter]
1370        Using default response p
1380 a,s    Partition number (2-4, default 2): [Enter]
1390 a,s    First sector (1026048-83886079, default 1026048): [Enter]
1400        Using default value 1026048
1410 a,s    Last sector, +sectors or +size{K,M,G} (1026048-83886079, default 83886079): [Enter]
1420        Using default value 83886079
1430        Partition 2 of type Linux and of size 39.5 GiB is set
1440
1450 a,s    Command (m for help): p
1460
1470        Disk /dev/sda: 42.9 GB, 42949672960 bytes, 83886000 sectors
```

```
1480        Units = sectors of 1 * 512 = 512 bytes
1490        Sector size (logical/physical): 512 bytes / 512 bytes
1500        I/O size (minimum/optimal): 512 bytes / 512 bytes
1510        Disk label type: dos
1520        Disk identifier: 0xc9c2368a
1530
1540           Device Boot      Start         End      Blocks   Id  System
1550        /dev/sda1   *        2048     1026047      512000   83  Linux
1560        /dev/sda2         1026048    83886079    41430016   83  Linux
1570
1580 a,s    Command (m for help): w
1590        The partition table has been altered!
1600
1610        Calling ioctl() to re-read partition table.
1620        Syncing disks.
1630
1640 a,s    fdisk -H 64 -S 32 /dev/sdb
1650        Welcome to fdisk (util-linux 2.23.2).
1660
1670        Changes will remain in memory only, until you decide to write them.
1680        Be careful before using the write command.
1690
1700        Device does not contain a recognized partition table
1710        Building a new DOS disklabel with disk identifier 0x2a058c02.
1720
1730 a,s    Command (m for help): o
1740        Building a new DOS disklabel with disk identifier 0xb3afd860.
1750
1760 a,s    Command (m for help): n
1770        Partition type:
1780           p   primary (0 primary, 0 extended, 4 free)
1790           e   extended
1800 a,s    Select (default p): [Enter]
1810        Using default response p
1820 a,s    Partition number (1-4, default 1): [Enter]
1830 a,s    First sector (2048-2097151, default 2048): [Enter]
1840        Using default value 2048
1850 a,s    Last sector, +sectors or +size{K,M,G} (2048-2097151, default 2097151): [Enter]
1860        Using default value 2097151
1870        Partition 1 of type Linux and of size 1023 MiB is set
```

```
1880
1890 a,s    Command (m for help): t
1900        Selected partition 1
1910 a,s    Hex code (type L to list all codes): 82
1920        Changed type of partition 'Linux' to 'Linux swap / Solaris'
1930
1940 a,s    Command (m for help): p
1950
1960        Disk /dev/sdb: 1073 MB, 1073741824 bytes, 2097152 sectors
1970        Units = sectors of 1 * 512 = 512 bytes
1980        Sector size (logical/physical): 512 bytes / 512 bytes
1990        I/O size (minimum/optimal): 512 bytes / 512 bytes
2000        Disk label type: dos
2010        Disk identifier: 0xb3afd860
2020
2030           Device Boot      Start         End      Blocks   Id  System
2040        /dev/sdb1            2048     2097151     1047552   82  Linux swap / Solaris
2050
2060 a,s    Command (m for help): w
2070        The partition table has been altered!
2080
2090        Calling ioctl() to re-read partition table.
2100        Syncing disks.
2110
2120 a,s    fdisk -l | grep /dev/ | sort
2130        /dev/sda1   *        2048     1026047      512000   83  Linux
2140        /dev/sda2         1026048    83886079    41430016   83  Linux
2150        /dev/sdb1            2048     2097151     1047552   82  Linux swap / Solaris
2160        Disk /dev/mapper/live-base: 2147 MB, 2147483648 bytes, 4194304 sectors
2170        Disk /dev/mapper/live-rw: 2147 MB, 2147483648 bytes, 4194304 sectors
2180        Disk /dev/sda: 42.9 GB, 42949672960 bytes, 83886080 sectors
2190        Disk /dev/sdb: 1073 MB, 1073741824 bytes, 2097152 sectors
2200        Disk /dev/sdc: 107.4 GB, 107374182400 bytes, 209715200 sectors
2210        Disk /dev/sdd: 107.4 GB, 107374182400 bytes, 209715200 sectors
2220        Disk /dev/sde: 107.4 GB, 107374182400 bytes, 209715200 sectors
2230        Disk /dev/sdf: 107.4 GB, 107374182400 bytes, 209715200 sectors
2240
2250   ○    「Ctrl + Alt + F6」キーを押下し、anaconda の「welcome」画面に戻ります。
2260
2270 a,s    # Ctrl + Alt + F6
```

2280
2290 ○ 「English (United States)」が選択されていることを確認し、「Continue」を選択します。
2300
2310 a,s # Continue
2320
2330 ○ 「DATE & TIME」を選択し、「Asia / Tokyo」を選択します。
2340
2350 a,s # DATE & TIME: Asia / Tokyo
2360
2370 ○ 「KEYBOARD」を選択し、「Japanese (OADG 109A)」のみ選ばれているように選択します。
2380
2390 a,s # KEYBOARD: Japanese (OADG 109A)
2400
2410 ○ 「INSTALLATION DESTINATION」を選択し、以下のように設定します。
2420
2430 デバイス名 FS MountPoint ラベル
2440 a,s # /dev/sda1 xfs /boot /boot
2450 a,s # /dev/sda2 xfs / /
2460 a,s # /dev/sdb1 swap swap
2470
2480 ○ 「Begin Install」を選択します。
2490
2500 a,s # Begin Install
2510
2520 ○ 「ROOT PASSWORD」を選択し、パスワードを設定します。
2530
2540 a,s # ROOT PASSWORD: ********
2550
2560 ○ 「Reboot」ボタンが表示されるのを待ち、「Reboot」を選択します。
2570
2580 a,s # Reboot
2590
2600 ○ 再起動処理中に Eject されたインストーラをDVDドライブから取り外します。
2610
2620 a,s # Eject DVD
2630
2640 ○ 再起動完了後、コンソールにてログインします。
2650
2660 Oracle Linux Server 7.3
2670 Kernel 4.1.12-61.1.18.el7uek.x86_64 on an x86_64

```
2680
2690 a,s    localhost login: root
2700 a,s    Password: ********
2710        [root@localhost ~] #
2720
2730   ○    MAC アドレスを確認します。
2740
2750 a,s    ip addr show
2760        1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN
2770            link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
2780            inet 127.0.0.1/8 scope host lo
2790               valid_lft forever preferred_lft forever
2800            inet6 ::1/128 scope host
2810               valid_lft forever preferred_lft forever
2820        2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen 1000
2830            link/ether 00:0c:29:08:b8:5f brd ff:ff:ff:ff:ff:ff
2840        3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen 1000
2850            link/ether 00:0c:29:08:b8:41 brd ff:ff:ff:ff:ff:ff
2860        4: eth2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen 1000
2870            link/ether 00:0c:29:08:b8:4b brd ff:ff:ff:ff:ff:ff
2880        5: eth3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen 1000
2890            link/ether 00:0c:29:08:b8:55 brd ff:ff:ff:ff:ff:ff
2900
2910   ○    MAC アドレスをもとに、 LAN ケーブルの結線(組み合わせ)を設計通りに修正します。
2920
2930            ※  この後の手順で、NIC デバイス名の方を入れ替えても構いません。
2940
2950   ○    IP アドレスを一時的に設定します。
2960
2970    a   ip addr add 10.110.88.57/26 dev eth0
2980
2990    s   ip addr add 10.110.88.58/26 dev eth0
3000
3010            ※  デバイス名が意図するものとずれている場合、デバイス名は適宜変更する必要があります。
3020
3030   ○    必要に応じて、デフォルトゲートウェイを一時的に設定します。
3040
3050        ip route add default via 10.110.88.1
3060
3070   ○    root にて、ssh でログインします。
```

```
3080
3090    a   ssh root@10.110.88.57
3100        The authenticity of host '10.110.88.57 (10.110.88.57)' can't be established.
3110        ECDSA key fingerprint is 95:bc:49:71:b2:a3:dd:ab:63:ad:35:e4:fe:4d:fc:82.
3120    a   Are you sure you want to continue connecting (yes/no)? yes
3130        Warning: Permanently added '10.110.88.57' (ECDSA) to the list of known hosts.
3140    a   root@10.110.88.57's password: ********
3150        Last login: Sat Oct 29 18:33:24 2016
3160
3170    s   ssh root@10.110.88.58
3180        The authenticity of host '10.110.88.58 (10.110.88.58)' can't be established.
3190        ECDSA key fingerprint is 8f:f6:81:0f:44:e1:83:d5:0a:9d:3f:90:7c:3e:93:73.
3200    s   Are you sure you want to continue connecting (yes/no)? yes
3210        Warning: Permanently added '10.110.88.58' (ECDSA) to the list of known hosts.
3220    s   root@10.110.88.58's password: ********
3230        Last login: Sat Oct 29 18:33:24 2016
3240
3250  ○     ストレージの情報を確認します。
3260
3270 a,s    fdisk -l | grep /dev/ | sort
3280        /dev/sda1   *        2048     1026047      512000   83  Linux
3290        /dev/sda2         1026048    83886079    41430016   83  Linux
3300        /dev/sdb1            2048     2097151     1047552   82  Linux swap / Solaris
3310        Disk /dev/sda: 42.9 GB, 42949672960 bytes, 83886080 sectors
3320        Disk /dev/sdb: 1073 MB, 1073741824 bytes, 2097152 sectors
3330        Disk /dev/sdc: 107.4 GB, 107374182400 bytes, 209715200 sectors
3340        Disk /dev/sdd: 107.4 GB, 107374182400 bytes, 209715200 sectors
3350        Disk /dev/sde: 107.4 GB, 107374182400 bytes, 209715200 sectors
3360        Disk /dev/sdf: 107.4 GB, 107374182400 bytes, 209715200 sectors
3370
3380 a,s    blkid
3390        /dev/sda2: LABEL="/" UUID="6fa3bde3-dc77-461d-8ae4-5a6ea5efba4c" TYPE="xfs"
3400        /dev/sda1: LABEL="/boot" UUID="11b16718-fa37-4aed-baff-2b643304e705" TYPE="xfs"
3410        /dev/sdb1: LABEL="swap" UUID="d561d285-585b-4790-9690-1b55598de94b" TYPE="swap"
3420
3430 a,s    cat /etc/fstab
3440        #
3450        # /etc/fstab
3460        # Created by anaconda on Fri Nov 25 11:55:06 2016
3470        #
```

```
3480        # Accessible filesystems, by reference, are maintained under '/dev/disk'
3490        # See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info
3500        #
3510        UUID=6fa3bde3-dc77-461d-8ae4-5a6ea5efba4c /                       xfs     defaults        0 0
3520        UUID=11b16718-fa37-4aed-baff-2b643304e705 /boot                   xfs     defaults        0 0
3530        UUID=d561d285-585b-4790-9690-1b55598de94b swap                    swap    defaults        0 0
3540
```

○ キーボード、ロケールの情報を確認します。

```
3550
3560
3570 a,s    cat /etc/vconsole.conf
3580        KEYMAP="jp-OADG109A"
3590        FONT="latarcyrheb-sun16"
3600
3610 a,s    cat /etc/locale.conf
3620        LANG="en_US.UTF-8"
3630
3640 a,s    localectl status
3650           System Locale: LANG=en_US.UTF-8
3660               VC Keymap: jp-OADG109A
3670              X11 Layout: jp
3680             X11 Variant: OADG109A
3690
```

○ タイムゾーンの情報を確認します。

```
3700
3710
3720 a,s    cat /etc/adjtime
3730        0.0 0 0.0
3740           0
3750        UTC
3760
3770 a,s    hwclock --debug
3780        hwclock from util-linux 2.23.2
3790        Using /dev interface to clock.
3800        Last drift adjustment done at 0 seconds after 1969
3810        Last calibration done at 0 seconds after 1969
3820        Hardware clock is on UTC time
3830        Assuming hardware clock is kept in UTC time.
3840        Waiting for clock tick...
3850        ...got clock tick
3860        Time read from Hardware Clock: 2016/11/25 04:31:00
3870        Hw clock time : 2016/11/25 04:31:00 = 1480048260 seconds since 1969
```

```
3880        Fri 25 Nov 2016 01:31:00 PM JST  -0.239477 seconds
3890
3900 a,s    ls -l /etc/localtime
3910        lrwxrwxrwx 1 root root 32 Nov 25 11:58 /etc/localtime -> ../usr/share/zoneinfo/Asia/Tokyo
3920
3930 a,s    timedatectl status
3940              Local time: Fri 2016-11-25 13:31:44 JST
3950          Universal time: Fri 2016-11-25 04:31:44 UTC
3960                RTC time: Fri 2016-11-25 04:31:43
3970               Time zone: Asia/Tokyo (JST, +0900)
3980             NTP enabled: n/a
3990        NTP synchronized: no
4000         RTC in local TZ: no
4010              DST active: n/a
4020
4030    ○   kdump の設定を確認します。
4040
4050 a,s    systemctl is-enabled kdump.service
4060        enabled
4070
4080 a,s    kdumpctl status
4090        Kdump is operational
4100
4110    ○   SELinux を無効化します。
4120
4130 a,s    sed -i -e 's/^SELINUX=.*$/SELINUX=disabled/' /etc/sysconfig/selinux
4140
4150            ※  カーネルパラメータで無効化していますが、運用上紛らわしいので設定ファイルも変更します。
4160
4170    ○   SELinux の設定を確認します。
4180
4190 a,s    grep -v ^# /etc/sysconfig/selinux
4200        SELINUX=disabled
4210        SELINUXTYPE=targeted
4220
4230 a,s    getenforce
4240        Disabled
4250
4260    ○   管理者用一般ユーザを作成します。
4270
```

```
4280 a,s    sed -i -e 's/^CREATE_MAIL_SPOOL=.*$/CREATE_MAIL_SPOOL=no/' /etc/default/useradd
4290
4300 a,s    groupadd -g 1000 admin
4310 a,s    useradd -g admin -G wheel -u 1000 admin
4320 a,s    echo 'password' | passwd --stdin admin
4330        Changing password for user admin.
4340        passwd: all authentication tokens updated successfully.
4350
4360 a,s    id admin
4370        uid=1000(admin) gid=1000(admin) groups=1000(admin),10(wheel)
4380
4390   ○    wheel グループのユーザがパスワードなしで sudo コマンドを使えるように設定します。
4400
4410 a,s    echo '%wheel ALL=(ALL) NOPASSWD: ALL' > /etc/sudoers.d/wheel
4420
4430   ○    管理者用一般ユーザにて、ssh でログインします。
4440
4450    a   ssh admin@10.110.88.57
4460    a   admin@10.110.88.57's password: ********
4470
4480    s   ssh admin@10.110.88.58
4490    s   admin@10.110.88.58's password: ********
4500
4510   ○    wheel グループのユーザのみが su コマンドを使えるように設定します。
4520
4530 a,s    sudo sed -i -e '/^#auth.*required.*pam_wheel.so use_uid$/ s/#//' /etc/pam.d/su
4540 a,s    echo "SU_WHEEL_ONLY yes" | sudo tee -a /etc/login.defs
4550
4560   ○    root アカウントでのパスワード認証による ssh 接続を禁止します。
4570
4580 a,s    sudo sed -i -e 's/^#PermitRootLogin .*$/PermitRootLogin without-password/' /etc/ssh/sshd_config
4590 a,s    sudo systemctl restart sshd
4600
4610   ○    参照・監視用一般ユーザを作成します。
4620
4630 a,s    sudo groupadd -g 1001 monitor
4640 a,s    sudo useradd -g monitor -u 1001 monitor
4650 a,s    echo 'password' | passwd --stdin monitor
4660        Changing password for user monitor.
4670        passwd: all authentication tokens updated successfully.
```

```
4680
4690 a,s    id monitor
4700        uid=1001(monitor) gid=1001(monitor) groups=1001(monitor)
4710
4720   ○    NIC のデバイス名をバス情報に基づいて固定します。
4730
4740 a,s    sudo cp /dev/null /etc/udev/rules.d/70-persistent-net.rules
4750 a,s    NUM=0
4760 a,s    while :
4770 a,s    do
4780 a,s      ip addr show eth$NUM > /dev/null 2>&1 || break
4790 a,s      BUS=$(ethtool -i eth$NUM | grep bus-info | awk '{print $2}')
4800 a,s      cat << EOF | sudo tee -a /etc/udev/rules.d/70-persistent-net.rules
4810 a,s    SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*", KERNELS=="$BUS", ATTR{type}=="1", NAME="eth$NUM"
4820 a,s    EOF
4830 a,s      NUM=$((NUM+1))
4840 a,s    done
4850        SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*", KERNELS=="0000:04:00.0", ATTR{type}=="1", NAME="eth0"
4860        SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*", KERNELS=="0000:0b:00.0", ATTR{type}=="1", NAME="eth1"
4870        SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*", KERNELS=="0000:13:00.0", ATTR{type}=="1", NAME="eth2"
4880        SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*", KERNELS=="0000:1b:00.0", ATTR{type}=="1", NAME="eth3"
4890
4900            ※  このファイルを編集して、NIC デバイス名を入れ替えても構いません。
4910            ※  KERNELS=="<バス情報>" を ATTR{address}=="<MAC アドレス>" に入れ替えても構いません。
4920
4930   ○    OS 起動時のカーネルパラメータを変更します。
4940
4950 a,s    sudo sed -i -e '/^GRUB_CMDLINE_LINUX=/ s/ *biosdevname=[^ "]*//' /etc/default/grub
4960 a,s    sudo sed -i -e '/^GRUB_CMDLINE_LINUX=/ s/ *net¥.ifnames=[^ "]*//' /etc/default/grub
4970 a,s    sudo sed -i -e '/^GRUB_CMDLINE_LINUX=/ s/rhgb quiet/ipv6.disable=1/' /etc/default/grub
4980 a,s    sudo grub2-mkconfig -o /boot/grub2/grub.cfg
4990        Generating grub configuration file ...
5000        Found linux image: /boot/vmlinuz-4.1.12-61.1.18.el7uek.x86_64
5010        Found initrd image: /boot/initramfs-4.1.12-61.1.18.el7uek.x86_64.img
5020        Found linux image: /boot/vmlinuz-3.10.0-514.el7.x86_64
5030        Found initrd image: /boot/initramfs-3.10.0-514.el7.x86_64.img
5040        Found linux image: /boot/vmlinuz-0-rescue-06dccd866dbd479b8a41b818455151b2
5050        Found initrd image: /boot/initramfs-0-rescue-06dccd866dbd479b8a41b818455151b2.img
5060        done
5070
```

```
5080        ※  「net.ifnames=0」「biosdevname=0」があると、前項の udev 設定が機能しません。
5090        ※  IPv6 を無効化しています。
5100
5110    ○   NIC を設定します。
5120
5130 a,s    BOND0_BONDING_OPTS="resend_igmp=1 updelay=0 use_carrier=1 miimon=100 downdelay=0 xmit_hash_policy=0"
5140 a,s    BOND0_BONDING_OPTS="$BOND0_BONDING_OPTS primary_reselect=0 fail_over_mac=0 arp_validate=0"
5150 a,s    BOND0_BONDING_OPTS="$BOND0_BONDING_OPTS mode=active-backup primary=eth0"              ※  LAG(LACP) の場合は「mode=802.3ad」
5160 a,s    BOND0_BONDING_OPTS="$BOND0_BONDING_OPTS lacp_rate=0 arp_interval=0 ad_select=0"
5170 a,s
5180 a,s    BOND1_BONDING_OPTS="resend_igmp=1 updelay=0 use_carrier=1 miimon=100 downdelay=0 xmit_hash_policy=0"
5190 a,s    BOND1_BONDING_OPTS="$BOND1_BONDING_OPTS primary_reselect=0 fail_over_mac=0 arp_validate=0"
5200 a,s    BOND1_BONDING_OPTS="$BOND1_BONDING_OPTS mode=active-backup primary=eth1"              ※  LAG(LACP) の場合は「mode=802.3ad」
5210 a,s    BOND1_BONDING_OPTS="$BOND1_BONDING_OPTS lacp_rate=0 arp_interval=0 ad_select=0"
5220 a,s
5230 a,s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-bond0
5240 a,s    DEVICE=bond0
5250 a,s    NAME=bond0
5260 a,s    TYPE=Bond
5270 a,s    UUID=$(uuidgen)
5280 a,s    BONDING_OPTS="$BOND0_BONDING_OPTS"
5290 a,s    BONDING_MASTER=yes
5300 a,s    ONBOOT=yes
5310 a,s    BOOTPROTO=none
5320 a,s    DEFROUTE=yes
5330 a,s    PEERDNS=no
5340 a,s    PEERROUTES=no
5350 a,s    IPV4_FAILURE_FATAL=yes
5360 a,s    IPV6INIT=no
5370 a,s    IPV6_AUTOCONF=no
5380 a,s    IPV6_DEFROUTE=no
5390 a,s    IPV6_PEERDNS=no
5400 a,s    IPV6_PEERROUTES=no
5410 a,s    IPV6_FAILURE_FATAL=no
5420 a,s    EOF
5430 a,s
5440 a,s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-bond1
5450 a,s    DEVICE=bond1
5460 a,s    NAME=bond1
5470 a,s    TYPE=Bond
```

```
5480 a, s    UUID=$(uuidgen)
5490 a, s    BONDING_OPTS="$BOND1_BONDING_OPTS"
5500 a, s    BONDING_MASTER=yes
5510 a, s    ONBOOT=yes
5520 a, s    BOOTPROTO=none
5530 a, s    DEFROUTE=no
5540 a, s    PEERDNS=no
5550 a, s    PEERROUTES=no
5560 a, s    IPV4_FAILURE_FATAL=yes
5570 a, s    IPV6INIT=no
5580 a, s    IPV6_AUTOCONF=no
5590 a, s    IPV6_DEFROUTE=no
5600 a, s    IPV6_PEERDNS=no
5610 a, s    IPV6_PEERROUTES=no
5620 a, s    IPV6_FAILURE_FATAL=no
5630 a, s    EOF
5640 a, s
5650 a, s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-eth0
5660 a, s    DEVICE=eth0
5670 a, s    NAME=eth0
5680 a, s    TYPE=Ethernet
5690 a, s    UUID=$(uuidgen)
5700 a, s    MASTER=bond0
5710 a, s    SLAVE=yes
5720 a, s    ONBOOT=yes
5730 a, s    MTU=9000
5740 a, s    EOF
5750 a, s
5760 a, s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-eth2
5770 a, s    DEVICE=eth2
5780 a, s    NAME=eth2
5790 a, s    TYPE=Ethernet
5800 a, s    UUID=$(uuidgen)
5810 a, s    MASTER=bond0
5820 a, s    SLAVE=yes
5830 a, s    ONBOOT=yes
5840 a, s    MTU=9000
5850 a, s    EOF
5860 a, s
5870 a, s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-eth1
```

```
5880 a,s    DEVICE=eth1
5890 a,s    NAME=eth1
5900 a,s    TYPE=Ethernet
5910 a,s    UUID=$(uuidgen)
5920 a,s    MASTER=bond1
5930 a,s    SLAVE=yes
5940 a,s    ONBOOT=yes
5950 a,s    MTU=9000
5960 a,s    EOF
5970 a,s
5980 a,s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-eth3
5990 a,s    DEVICE=eth3
6000 a,s    NAME=eth3
6010 a,s    TYPE=Ethernet
6020 a,s    UUID=$(uuidgen)
6030 a,s    MASTER=bond1
6040 a,s    SLAVE=yes
6050 a,s    ONBOOT=yes
6060 a,s    MTU=9000
6070 a,s    EOF
6080 a,s
6090    a   # for Active
6100    a   cat << EOF | sudo tee -a /etc/sysconfig/network-scripts/ifcfg-bond0
6110    a   IPADDR=10.110.88.57
6120    a   PREFIX=26
6130    a   GATEWAY=10.110.88.1
6140    a   DNS1=10.0.80.11
6150    a   DNS2=10.0.80.12
6160    a   DOMAIN=example.com
6170    a   MTU=9000
6180    a   EOF
6190    a
6200    a   cat << EOF | sudo tee -a /etc/sysconfig/network-scripts/ifcfg-bond1
6210    a   IPADDR=192.168.1.2
6220    a   PREFIX=24
6230    a   MTU=9000
6240    a   EOF
6250    a
6260    s   # for Stand-by
6270    s   cat << EOF | sudo tee -a /etc/sysconfig/network-scripts/ifcfg-bond0
```

```
6280    s   IPADDR=10.110.88.58
6290    s   PREFIX=26
6300    s   GATEWAY=10.110.88.1
6310    s   DNS1=10.0.80.11
6320    s   DNS2=10.0.80.12
6330    s   DOMAIN=example.com
6340    s   MTU=9000
6350    s   EOF
6360    s
6370    s   cat << EOF | sudo tee -a /etc/sysconfig/network-scripts/ifcfg-bond1
6380    s   IPADDR=192.168.1.3
6390    s   PREFIX=24
6400    s   MTU=9000
6410    s   EOF
6420
6430    ○   NIC オフロード機能を無効化します。
6440
6450 a, s   cat << 'EOF' | sudo tee /etc/NetworkManager/dispatcher.d/00-ethertool
6460 a, s   #!/bin/sh
6470 a, s   if [ "$2" == "up" ]; then
6480 a, s     if [ "${1:0:3}" == "eth" ]; then
6490 a, s       ethtool -K $1 ¥
6500 a, s         rx off ¥
6510 a, s         tx off ¥
6520 a, s         sg off ¥
6530 a, s         tso off ¥
6540 a, s         ufo off ¥
6550 a, s         gso off ¥
6560 a, s         gro off ¥
6570 a, s         lro off ¥
6580 a, s         rxvlan off ¥
6590 a, s         txvlan off ¥
6600 a, s         ntuple off ¥
6610 a, s         rxhash off ¥
6620 a, s         highdma off ¥
6630 a, s         rx-vlan-filter off ¥
6640 a, s         tx-gso-robust off ¥
6650 a, s         tx-fcoe-segmentation off ¥
6660 a, s         fcoe-mtu off ¥
6670 a, s         tx-nocache-copy off ¥
```

```
6680 a,s         loopback off ¥
6690 a,s         rx-fcs off ¥
6700 a,s         rx-all off
6710 a,s       #ethtool -K $1 vlan-challenged off tx-lockless off netns-local off
6720 a,s       ethtool -G $1 rx 4096 tx 4096 rx-jumbo 2048
6730 a,s     fi
6740 a,s   fi
6750 a,s   EOF
6760 a,s   sudo chmod 755 /etc/NetworkManager/dispatcher.d/00-ethertool
6770
6780           ※  「VMXNET 3」「e1000e」「igb」「ixgbe」でのみ動作確認しました。
6790           ※  NIC のリンク速度、duplex モードを設定したい場合はこのスクリプトに組み込みます。
6800
6810   ○   hosts を設定します。
6820
6830 a,s   cat << 'EOF' | sudo tee /etc/hosts
6840 a,s   127.0.0.1       localhost localhost.localdomain localhost4 localhost4.localdomain4
6850 a,s   ::1             localhost localhost.localdomain localhost6 localhost6.localdomain6
6860 a,s   10.110.88.57    iscsitgt01a.example.com iscsitgt01a
6870 a,s   10.110.88.58    iscsitgt01s.example.com iscsitgt01s
6880 a,s   10.110.88.59    iscsitgt01.example.com iscsitgt01
6890 a,s   192.168.1.2     iscsitgt01a-ic.example.com iscsitgt01a-ic
6900 a,s   192.168.1.3     iscsitgt01s-ic.example.com iscsitgt01s-ic
6910 a,s   EOF
6920
6930   ○   hostname を設定します。
6940
6950    a  sudo hostnamectl set-hostname iscsitgt01a.example.com
6960
6970    s  sudo hostnamectl set-hostname iscsitgt01s.example.com
6980
6990   ○   yum リポジトリを設定します。
7000
7010 a,s   cat << 'EOF' | sudo tee /etc/yum.repos.d/media.repo
7020 a,s   [media]
7030 a,s   name=media
7040 a,s   baseurl=file:///mnt
7050 a,s   gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-oracle
7060 a,s   gpgcheck=1
7070 a,s   enabled=0
```

```
7080 a,s
7090 a,s    [media-mysql]
7100 a,s    name=media-mysql
7110 a,s    baseurl=file:///mnt/addons/Mysql
7120 a,s    gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-oracle
7130 a,s    gpgcheck=1
7140 a,s    enabled=0
7150 a,s
7160 a,s    [media-ha]
7170 a,s    name=media-ha
7180 a,s    baseurl=file:///mnt/addons/HighAvailability
7190 a,s    gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-oracle
7200 a,s    gpgcheck=1
7210 a,s    enabled=0
7220 a,s
7230 a,s    [media-rs]
7240 a,s    name=media-rs
7250 a,s    baseurl=file:///mnt/addons/ResilientStorage
7260 a,s    gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-oracle
7270 a,s    gpgcheck=1
7280 a,s    enabled=0
7290 a,s    EOF
7300
7310            ※  インストール・メディアを利用可能にします。
7320
7330 a,s    sudo sed -i -e 's/^/#/' /etc/yum.repos.d/public-yum-ol7.repo
7340
7350            ※  インターネット接続していないとエラーとなるリポジトリを無効化します。
7360
7370    ○   以下のインストーラを DVD ドライブにセットします。
7380
7390 a,s    # V834394-01.iso (Oracle Linux 7.3)
7400
7410    ○   インストーラをマウントします。
7420
7430 a,s    sudo mount /dev/cdrom /mnt
7440        mount: /dev/sr0 is write-protected, mounting read-only
7450
7460    ○   どのような環境でも共通して導入しておいた方がよいと思われる標準パッケージをインストールします。
7470
```

```
7480 a,s    sudo yum -y --disablerepo=¥* --enablerepo=media,media-mysql install ¥
7490 a,s     @development ¥
7500 a,s     @base ¥
7510 a,s     OpenIPMI ¥
7520 a,s     aide ¥
7530 a,s     dos2unix ¥
7540 a,s     dropwatch ¥
7550 a,s     dstat ¥
7560 a,s     expect ¥
7570 a,s     filebench ¥
7580 a,s     freeipmi-bmc-watchdog ¥
7590 a,s     freeipmi-ipmidetectd ¥
7600 a,s     ftp ¥
7610 a,s     haproxy ¥
7620 a,s     hdparm ¥
7630 a,s     iotop ¥
7640 a,s     ipmitool ¥
7650 a,s     iptables-services ¥
7660 a,s     iptraf-ng ¥
7670 a,s     iptstate ¥
7680 a,s     ipvsadm ¥
7690 a,s     iscsi-initiator-utils ¥
7700 a,s     keepalived ¥
7710 a,s     kernel-uek-devel ¥
7720 a,s     latrace ¥
7730 a,s     lftp ¥
7740 a,s     lm_sensors ¥
7750 a,s     logwatch ¥
7760 a,s     lrzsz ¥
7770 a,s     ltrace ¥
7780 a,s     net-snmp-utils ¥
7790 a,s     nmap ¥
7800 a,s     openssl-devel ¥
7810 a,s     oprofile ¥
7820 a,s     pax ¥
7830 a,s     perf ¥
7840 a,s     prelink ¥
7850 a,s     screen ¥
7860 a,s     sg3_utils ¥
7870 a,s     snapper ¥
```

```
7880 a, s     telnet ¥
7890 a, s     tmpwatch ¥
7900 a, s     trace-cmd ¥
7910 a, s     tree ¥
7920 a, s     x86info
7930
7940    ○     インストーラをアンマウントします。
7950
7960 a, s     sudo umount /mnt
7970
7980    ○     インストーラをDVDドライブから取り外します。
7990
8000 a, s     # Eject DVD
8010
8020    ○     NTP を設定します。
8030
8040 a, s     cat << 'EOF' | sudo tee /etc/chrony.conf
8050 a, s     server 10.0.77.54 iburst
8060 a, s     # server ***.***.***.*** iburst
8070 a, s     # server ***.***.***.*** iburst
8080 a, s     # server ***.***.***.*** iburst
8090 a, s
8100 a, s     # Use public servers from the pool.ntp.org project.
8110 a, s     # Please consider joining the pool (http://www.pool.ntp.org/join.html).
8120 a, s
8130 a, s     # Ignore stratum in source selection.
8140 a, s     stratumweight 0
8150 a, s
8160 a, s     # Record the rate at which the system clock gains/losses time.
8170 a, s     driftfile /var/lib/chrony/drift
8180 a, s
8190 a, s     # Enable kernel RTC synchronization.
8200 a, s     rtcsync
8210 a, s
8220 a, s     # In first three updates step the system clock instead of slew
8230 a, s     # if the adjustment is larger than 10 seconds.
8240 a, s     makestep 10 3
8250 a, s
8260 a, s     # Allow NTP client access from local network.
8270 a, s     #allow 192.168/16
```

```
8280 a,s
8290 a,s    # Listen for commands only on localhost.
8300 a,s    bindcmdaddress 127.0.0.1
8310 a,s    #bindcmdaddress ::1
8320 a,s
8330 a,s    # Serve time even if not synchronized to any NTP server.
8340 a,s    #local stratum 10
8350 a,s
8360 a,s    keyfile /etc/chrony.keys
8370 a,s
8380 a,s    # Specify the key used as password for chronyc.
8390 a,s    commandkey 1
8400 a,s
8410 a,s    # Generate command key if missing.
8420 a,s    generatecommandkey
8430 a,s
8440 a,s    # Disable logging of client accesses.
8450 a,s    noclientlog
8460 a,s
8470 a,s    # Send a message to syslog if a clock adjustment is larger than 0.5 seconds.
8480 a,s    logchange 0.5
8490 a,s
8500 a,s    logdir /var/log/chrony
8510 a,s    #log measurements statistics tracking
8520 a,s    EOF
8530 a,s
8540 a,s    cat << 'EOF' | sudo tee /etc/sysconfig/chronyd
8550 a,s    OPTIONS="-4"
8560 a,s    EOF
8570
```

8580 ○ 不要なサービスを無効化します。

```
8590
8600 a,s    sudo systemctl disable dmraid-activation.service
8610 a,s    sudo systemctl disable firewalld.service
8620 a,s    sudo systemctl disable mdmonitor.service
8630 a,s    sudo systemctl disable postfix.service
8640
```

8650 ※ 仮想環境の場合は、「smartd.service」も無効化します。RAID コントローラが対応していない場合も無効化します。

```
8660
```

8670 ○ 必要なサービスを有効化します。

```
8680
8690 a,s    sudo systemctl enable psacct.service
8700
8710   ○    iSCSI イニシエータ関連サービスの自動起動を無効化します。
8720
8730 a,s    sudo systemctl disable iscsi.service
8740        Removed symlink /etc/systemd/system/sysinit.target.wants/iscsi.service.
8750
8760 a,s    sudo systemctl disable iscsid.socket
8770        Removed symlink /etc/systemd/system/sockets.target.wants/iscsid.socket.
8780
8790 a,s    sudo systemctl disable iscsiuio.socket
8800        Removed symlink /etc/systemd/system/sockets.target.wants/iscsiuio.socket.
8810
8820   ○    IPv6 無効化に伴う不具合を解消するための設定変更を行います。
8830
8840 a,s    sudo sed -i -e 's/^#AddressFamily .*$/AddressFamily inet/' /etc/ssh/sshd_config
8850 a,s    sudo sed -i -e 's/^inet_interfaces .*$/inet_interfaces = 127.0.0.1/' /etc/postfix/main.cf
8860
8870 a,s    sudo sed -i -e 's/^udp6/#udp6/' -e 's/^tcp6/#tcp6/' /etc/netconfig
8880
8890   ○    再起動します。
8900
8910 a,s    sudo reboot
8920
8930   ○    管理者用一般ユーザにて、ssh でログインします。
8940
8950    a   ssh admin@10.110.88.57
8960    a   admin@10.110.88.57's password: ********
8970
8980    s   ssh admin@10.110.88.58
8990    s   admin@10.110.88.58's password: ********
9000
9010   ○    カーネル起動パラメータを確認します。
9020
9030 a,s    cat /proc/cmdline
9040        BOOT_IMAGE=/vmlinuz-4.1.12-61.1.18.el7uek.x86_64 root=UUID=657f59aa-f627-4096-9970-9238b234ef00 ro crashkernel=auto selinux=0 ipv6.disable=1
9050
9060            ※  「crashkernel」の値は、搭載メモリサイズに応じて自動的に固定値へ変更される場合があります。
9070
```

○ ネットワーク設定を確認します。

a, s
```
ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
2: eth0: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 9000 qdisc mq master bond0 state UP qlen 1000
    link/ether 00:0c:29:08:b8:5f brd ff:ff:ff:ff:ff:ff
3: eth1: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 9000 qdisc mq master bond1 state UP qlen 1000
    link/ether 00:0c:29:08:b8:41 brd ff:ff:ff:ff:ff:ff
4: eth2: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 9000 qdisc mq master bond0 state UP qlen 1000
    link/ether 00:0c:29:08:b8:5f brd ff:ff:ff:ff:ff:ff
5: eth3: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 9000 qdisc mq master bond1 state UP qlen 1000
    link/ether 00:0c:29:08:b8:41 brd ff:ff:ff:ff:ff:ff
6: bond0: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 9000 qdisc noqueue state UNKNOWN
    link/ether 00:0c:29:08:b8:5f brd ff:ff:ff:ff:ff:ff
    inet 10.110.88.57/26 brd 10.110.88.63 scope global bond0
7: bond1: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 9000 qdisc noqueue state UNKNOWN
    link/ether 00:0c:29:08:b8:41 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.2/24 brd 192.168.0.255 scope global bond1
```

※ IPv6 のリンクローカルアドレスが存在しないことも確認します。

a, s
```
cat /proc/net/bonding/bond0
Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)

Bonding Mode: fault-tolerance (active-backup)
Primary Slave: eth0 (primary_reselect always)
Currently Active Slave: eth0
MII Status: up
MII Polling Interval (ms): 100
Up Delay (ms): 0
Down Delay (ms): 0

Slave Interface: eth0
MII Status: up
Speed: 10000 Mbps
Duplex: full
Link Failure Count: 0
Permanent HW addr: 00:0c:29:08:b8:5f
```

```
9480        Slave queue ID: 0
9490
9500        Slave Interface: eth2
9510        MII Status: up
9520        Speed: 10000 Mbps
9530        Duplex: full
9540        Link Failure Count: 0
9550        Permanent HW addr: 00:0c:29:08:b8:4b
9560        Slave queue ID: 0
9570
9580 a,s    cat /proc/net/bonding/bond1
9590        Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)
9600
9610        Bonding Mode: fault-tolerance (active-backup)
9620        Primary Slave: eth1 (primary_reselect always)
9630        Currently Active Slave: eth1
9640        MII Status: up
9650        MII Polling Interval (ms): 100
9660        Up Delay (ms): 0
9670        Down Delay (ms): 0
9680
9690        Slave Interface: eth1
9700        MII Status: up
9710        Speed: 10000 Mbps
9720        Duplex: full
9730        Link Failure Count: 0
9740        Permanent HW addr: 00:0c:29:08:b8:41
9750        Slave queue ID: 0
9760
9770        Slave Interface: eth3
9780        MII Status: up
9790        Speed: 10000 Mbps
9800        Duplex: full
9810        Link Failure Count: 0
9820        Permanent HW addr: 00:0c:29:08:b8:55
9830        Slave queue ID: 0
9840
9850            ※  ボンディング設定時は、このコマンドで個々の NIC の MAC アドレスを確認できます。
9860
9870            ※  LAG(LACP) の場合、以下のように表示されます。
```

```
cat /proc/net/bonding/bond1
Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)

Bonding Mode: IEEE 802.3ad Dynamic link aggregation
Transmit Hash Policy: layer2 (0)
MII Status: up
MII Polling Interval (ms): 100
Up Delay (ms): 0
Down Delay (ms): 0

802.3ad info
LACP rate: slow
Min links: 0
Aggregator selection policy (ad_select): stable
Active Aggregator Info:
        Aggregator ID: 1
        Number of ports: 1
        Actor Key: 13
        Partner Key: 1
        Partner Mac Address: 00:00:00:00:00:00

Slave Interface: eth1
MII Status: up
Speed: 10000 Mbps
Duplex: full
Link Failure Count: 0
Permanent HW addr: 00:0c:29:8b:ff:e8
Slave queue ID: 0
Aggregator ID: 1
Actor Churn State: none
Partner Churn State: churned
Actor Churned Count: 0
Partner Churned Count: 1
details actor lacp pdu:
    system priority: 0
    port key: 13
    port priority: 255
    port number: 1
    port state: 205
details partner lacp pdu:
```

```
10280                   system priority: 65535
10290                   oper key: 1
10300                   port priority: 255
10310                   port number: 1
10320                   port state: 3
10330
10340               Slave Interface: eth3
10350               MII Status: up
10360               Speed: 10000 Mbps
10370               Duplex: full
10380               Link Failure Count: 0
10390               Permanent HW addr: 00:0c:29:8b:ff:fc
10400               Slave queue ID: 0
10410               Aggregator ID: 2
10420               Actor Churn State: churned
10430               Partner Churn State: churned
10440               Actor Churned Count: 1
10450               Partner Churned Count: 1
10460               details actor lacp pdu:
10470                   system priority: 0
10480                   port key: 13
10490                   port priority: 255
10500                   port number: 2
10510                   port state: 197
10520               details partner lacp pdu:
10530                   system priority: 65535
10540                   oper key: 1
10550                   port priority: 255
10560                   port number: 1
10570                   port state: 3
10580
10590   a   ip route show
10600       default via 10.110.88.1 dev bond0  proto static  metric 300
10610       10.110.88.0/26 dev bond0  proto kernel  scope link  src 10.110.88.57  metric 300
10620       192.168.1.0/24 dev bond1  proto kernel  scope link  src 192.168.0.2  metric 300
10630
10640   s   ip route show
10650       default via 10.110.88.1 dev bond0  proto static  metric 300
10660       10.110.88.0/26 dev bond0  proto kernel  scope link  src 10.110.88.58  metric 300
10670       192.168.1.0/24 dev bond1  proto kernel  scope link  src 192.168.0.3  metric 300
```

```
10680
10690 a,s    cat /etc/resolv.conf
10700        # Generated by NetworkManager
10710        search example.com
10720        nameserver 10.0.80.11
10730        nameserver 10.0.80.12
10740
```

○ hostname 設定を確認します。

```
10770    a   hostnamectl status
10780            Static hostname: iscsitgt01a.example.com
10790                  Icon name: computer-vm
10800                    Chassis: vm
10810                 Machine ID: d7806eba789047baa165a57149c83843
10820                    Boot ID: b5b36a3403dd403aad4656d2f7f9e7aa
10830             Virtualization: vmware
10840           Operating System: Oracle Linux Server 7.3
10850                CPE OS Name: cpe:/o:oracle:linux:7:2:server
10860                     Kernel: Linux 4.1.12-61.1.18.el7uek.x86_64
10870                Architecture: x86-64
10880
10890    s   hostnamectl status
10900            Static hostname: iscsitgt01s.example.com
10910                  Icon name: computer-vm
10920                    Chassis: vm
10930                 Machine ID: b325c1c5d682439a91a65f7cfc317b20
10940                    Boot ID: a419d4d1ef00452f93da10a227365aca
10950             Virtualization: vmware
10960           Operating System: Oracle Linux Server 7.3
10970                CPE OS Name: cpe:/o:oracle:linux:7:2:server
10980                     Kernel: Linux 4.1.12-61.1.18.el7uek.x86_64
10990                Architecture: x86-64
11000
```

○ NIC のオフロード設定を確認します。

```
11030 a,s    ethtool -k eth0
11040        Features for eth0:
11050        rx-checksumming: off
11060        tx-checksumming: off
11070                tx-checksum-ipv4: off [fixed]
```

```
11080                   tx-checksum-ip-generic: off
11090                   tx-checksum-ipv6: off [fixed]
11100                   tx-checksum-fcoe-crc: off [fixed]
11110                   tx-checksum-sctp: off [fixed]
11120           scatter-gather: off
11130                   tx-scatter-gather: off
11140                   tx-scatter-gather-fraglist: off [fixed]
11150           tcp-segmentation-offload: off
11160                   tx-tcp-segmentation: off
11170                   tx-tcp-ecn-segmentation: off [fixed]
11180                   tx-tcp6-segmentation: off
11190           udp-fragmentation-offload: off [fixed]
11200           generic-segmentation-offload: off
11210           generic-receive-offload: off
11220           large-receive-offload: off
11230           rx-vlan-offload: off
11240           tx-vlan-offload: off
11250           ntuple-filters: off [fixed]
11260           receive-hashing: off
11270           highdma: off
11280           rx-vlan-filter: on [fixed]
11290           vlan-challenged: off [fixed]
11300           tx-lockless: off [fixed]
11310           netns-local: off [fixed]
11320           tx-gso-robust: off [fixed]
11330           tx-fcoe-segmentation: off [fixed]
11340           tx-gre-segmentation: off [fixed]
11350           tx-ipip-segmentation: off [fixed]
11360           tx-sit-segmentation: off [fixed]
11370           tx-udp_tnl-segmentation: off [fixed]
11380           fcoe-mtu: off [fixed]
11390           tx-nocache-copy: off
11400           loopback: off [fixed]
11410           rx-fcs: off [fixed]
11420           rx-all: off [fixed]
11430           tx-vlan-stag-hw-insert: off [fixed]
11440           rx-vlan-stag-hw-parse: off [fixed]
11450           rx-vlan-stag-filter: off [fixed]
11460           l2-fwd-offload: off [fixed]
11470           busy-poll: off [fixed]
```

```
11480       hw-switch-offload: off [fixed]
11490
11500 a,s   ethtool -k eth1
11510 a,s   ethtool -k eth2
11520 a,s   ethtool -k eth3
11530
11540 a,s   ethtool -g eth0
11550       Ring parameters for eth0:
11560       Pre-set maximums:
11570       RX:             4096
11580       RX Mini:        0
11590       RX Jumbo:       2048
11600       TX:             4096
11610       Current hardware settings:
11620       RX:             4032
11630       RX Mini:        0
11640       RX Jumbo:       2048
11650       TX:             4096
11660
11670           ※  搭載メモリサイズに応じて結果が異なります。
11680
11690 a,s   ethtool -g eth1
11700 a,s   ethtool -g eth2
11710 a,s   ethtool -g eth3
11720
11730   ○   NTP の状態を確認します。
11740
11750 a,s   systemctl status chronyd.service -l
11760       ● chronyd.service - NTP client/server
11770          Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enabled; vendor preset: enabled)
11780          Active: active (running) since Fri 2016-11-25 15:23:28 JST; 17min ago
11790         Process: 601 ExecStartPost=/usr/libexec/chrony-helper update-daemon (code=exited, status=0/SUCCESS)
11800         Process: 576 ExecStart=/usr/sbin/chronyd $OPTIONS (code=exited, status=0/SUCCESS)
11810        Main PID: 583 (chronyd)
11820          CGroup: /system.slice/chronyd.service
11830                  └583 /usr/sbin/chronyd -4
11840
11850       Nov 25 15:23:28 iscsitgt01a.example.com systemd[1]: Starting NTP client/server...
11860       Nov 25 15:23:28 iscsitgt01a.example.com chronyd[584]: chronyd version 2.1.1 starting (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +DEBUG +ASYNCDNS +IPV6 +SECHASH)
11870       Nov 25 15:23:28 iscsitgt01a.example.com chronyd[584]: Generated key 1
```

```
11880         Nov 25 15:23:28 iscsitgt01a.example.com systemd[1]: Started NTP client/server.
11890         Nov 25 15:23:35 iscsitgt01a.example.com chronyd[584]: Selected source 10.0.77.54
11900
11910 a,s     chronyc sources
11920         210 Number of sources = 1
11930         MS Name/IP address         Stratum Poll Reach LastRx Last sample
11940         ===============================================================================
11950         ^* 10.0.77.54                    1   10   377   217   -177us[ -161us] +/- 4360us
11960
11970 a,s     timedatectl status
11980               Local time: Fri 2016-11-25 15:43:54 JST
11990         Universal time: Fri 2016-11-25 06:43:54 UTC
12000               RTC time: Fri 2016-11-25 06:43:54
12010              Time zone: Asia/Tokyo (JST, +0900)
12020           NTP enabled: yes
12030      NTP synchronized: yes
12040       RTC in local TZ: no
12050            DST active: n/a
12060
12070    ○    自動起動するサービスを確認します。
12080
12090 a,s     systemctl list-unit-files | grep enabled | LANG=C sort
12100         NetworkManager-dispatcher.service           enabled
12110         NetworkManager.service                      enabled
12120         abrt-ccpp.service                           enabled
12130         abrt-oops.service                           enabled
12140         abrt-vmcore.service                         enabled
12150         abrt-xorg.service                           enabled
12160         abrtd.service                               enabled
12170         atd.service                                 enabled
12180         auditd.service                              enabled
12190         autovt@.service                             enabled
12200         chronyd.service                             enabled
12210         crond.service                               enabled
12220         dbus-org.freedesktop.NetworkManager.service enabled
12230         dbus-org.freedesktop.nm-dispatcher.service  enabled
12240         default.target                              enabled
12250         dm-event.socket                             enabled
12260         getty@.service                              enabled
12270         irqbalance.service                          enabled
```

```
12280         kdump.service                           enabled
12290         libstoragemgmt.service                  enabled
12300         lm_sensors.service                      enabled       ※  仮想環境の場合、不要
12310         lvm2-lvmetad.socket                     enabled       ※  LVM を利用しない場合、不要
12320         lvm2-lvmpolld.socket                    enabled       ※  LVM を利用しない場合、不要
12330         lvm2-monitor.service                    enabled       ※  LVM を利用しない場合、不要
12340         microcode.service                       enabled
12350         multi-user.target                       enabled
12360         psacct.service                          enabled
12370         remote-fs.target                        enabled       ※  nfs, iSCSI イニシエータを利用しない場合、不要
12380         rngd.service                            enabled
12390         rpcbind.socket                          enabled       ※  nfs を利用しない場合、不要
12400         rsyslog.service                         enabled
12410         runlevel2.target                        enabled
12420         runlevel3.target                        enabled
12430         runlevel4.target                        enabled
12440         smartd.service                          enabled       ※  仮想環境、RAID コントローラ未対応の場合、不要
12450         sshd.service                            enabled
12460         sysstat.service                         enabled
12470         systemd-readahead-collect.service       enabled
12480         systemd-readahead-drop.service          enabled
12490         systemd-readahead-replay.service        enabled
12500         tuned.service                           enabled
12510         vmtoolsd.service                        enabled       ※  ESXi で動かす場合のみ必要
12520
12530   ○     設定ファイルをバックアップします。
12540
12550 a,s     sudo cp -a /etc{,~}
12560
12570
```

○ 【iSCSI Target クラスタのインストールと初期設定】

○ 以下のインストーラを DVD ドライブにセットします。

a, s
```
# V834394-01.iso (Oracle Linux 7.3)
```

○ インストーラをマウントします。

a, s
```
sudo mount /dev/cdrom /mnt
mount: /dev/sr0 is write-protected, mounting read-only
```

○ 当該 OS で必要となる標準パッケージをインストールします。

a, s
```
sudo yum -y --disablerepo=¥* --enablerepo=media,media-mysql,media-ha install ¥
 fence-agents-ipmilan ¥
 omping ¥
 pcs ¥
 rubygem-abrt ¥
 targetcli
```

○ インターネットと接続可能な端末で以下のコマンドを実行する等して、必要なパッケージを収集します。

o
```
curl -O http://elrepo.org/linux/elrepo/el7/x86_64/RPMS/drbd84-utils-8.9.6-1.el7.elrepo.x86_64.rpm
```

○ 収集したパッケージをホームディレクトリにコピーし、確認します。

a, s
```
scp xxxx@yyy:drbd84-utils-8.9.6-1.el7.elrepo.x86_64.rpm .
```

a, s
```
ls -l *.rpm
-rw-rw-r-- 1 admin admin 410308 Nov 25 16:10 drbd84-utils-8.9.6-1.el7.elrepo.x86_64.rpm
```

a, s
```
file *.rpm
drbd84-utils-8.9.6-1.el7.elrepo.x86_64.rpm:                RPM v3.0 bin i386/x86_64 drbd84-utils-8.9.6-1.el7.elrepo
```

○ drbd 管理ツールをインストールします。Oracle 社サポート外のパッケージです。

a, s
```
sudo yum -y --disablerepo=¥* --enablerepo=media localinstall drbd84-utils-*.rpm
```

○ インストーラをアンマウントします。

```
12980 a, s    sudo umount /mnt
12990
13000   ○     インストーラをDVDドライブから外します。
13010
13020 a, s    # Eject DVD
13030
13040   ○     追加インストールしたパッケージの設定をバックアップします。
13050
13060 a, s    sudo cp -a /etc{,~}/bash_completion.d/drbdadm
13070 a, s    sudo cp -a /etc{,~}/corosync
13080 a, s    sudo cp -a /etc{,~}/dbus-1/system.d/corosync-signals.conf
13090 a, s    sudo cp -a /etc{,~}/drbd.conf
13100 a, s    sudo cp -a /etc{,~}/drbd.d
13110 a, s    sudo cp -a /etc{,~}/ha.d
13120 a, s    sudo cp -a /etc{,~}/libreport/events.d/ruby_event.conf
13130 a, s    sudo cp -a /etc{,~}/logrotate.d/corosync
13140 a, s    sudo cp -a /etc{,~}/logrotate.d/pacemaker
13150 a, s    sudo cp -a /etc{,~}/logrotate.d/pcsd
13160 a, s    sudo cp -a /etc{,~}/pam.d/pcsd
13170 a, s    sudo cp -a /etc{,~}/sysconfig/corosync
13180 a, s    sudo cp -a /etc{,~}/sysconfig/corosync-notifyd
13190 a, s    sudo cp -a /etc{,~}/sysconfig/crm_mon
13200 a, s    sudo cp -a /etc{,~}/sysconfig/pacemaker
13210 a, s    sudo cp -a /etc{,~}/sysconfig/pcsd
13220 a, s    sudo cp -a /etc{,~}/target
13230 a, s    sudo cp -a /etc{,~}/xen
13240 a, s    sudo cp -a /etc/passwd   /etc~/passwd_$(date +%Y%m%d_%H%M%S)
13250 a, s    sudo cp -a /etc/passwd-  /etc~/passwd-_$(date +%Y%m%d_%H%M%S)
13260 a, s    sudo cp -a /etc/shadow   /etc~/shadow_$(date +%Y%m%d_%H%M%S)
13270 a, s    sudo cp -a /etc/shadow-  /etc~/shadow-_$(date +%Y%m%d_%H%M%S)
13280 a, s    sudo cp -a /etc/group    /etc~/group_$(date +%Y%m%d_%H%M%S)
13290 a, s    sudo cp -a /etc/group-   /etc~/group-_$(date +%Y%m%d_%H%M%S)
13300 a, s    sudo cp -a /etc/gshadow  /etc~/gshadow_$(date +%Y%m%d_%H%M%S)
13310 a, s    sudo cp -a /etc/gshadow- /etc~/gshadow-_$(date +%Y%m%d_%H%M%S)
13320 a, s
13330   ○     カーネルパラメータを設定します。
13340
13350 a, s    cat << 'EOF' | sudo tee /etc/sysctl.d/tgt.conf
13360 a, s    net.core.netdev_max_backlog = 250000
13370 a, s    net.core.optmem_max = 16777216
```

```
13380 a,s    net.core.rmem_default = 16777216
13390 a,s    net.core.rmem_max = 16777216
13400 a,s    net.core.wmem_default = 16777216
13410 a,s    net.core.wmem_max = 16777216
13420 a,s    net.ipv4.tcp_mem = 39363 209944 314904
13430 a,s    net.ipv4.tcp_rmem = 8192 87380 16777216
13440 a,s    net.ipv4.tcp_wmem = 8192 65536 16777216
13450 a,s    net.ipv4.tcp_no_metrics_save = 1
13460 a,s    net.ipv4.tcp_sack = 0
13470 a,s    net.ipv4.tcp_timestamps = 0
13480 a,s    EOF
13490
13500   ○    再起動します。
13510
13520 a,s    sudo reboot
13530
13540   ○    管理者用一般ユーザにて、ssh でログインします。
13550
13560    a   ssh admin@10.110.88.57
13570    a   admin@10.110.88.57's password: ********
13580
13590    s   ssh admin@10.110.88.58
13600    s   admin@10.110.88.58's password: ********
13610
13620   ○    カーネルパラメータを確認します。
13630
13640 a,s    sysctl -a 2> /dev/null | egrep 'net¥.core¥..*mem|net¥.core¥.netdev_m|net¥.ipv4¥.tcp_.*mem|net¥.ipv4¥.tcp_no_|net¥.ipv4¥.tcp_sa|net¥.ipv4¥.tcp_ti'
13650        net.core.netdev_max_backlog = 250000
13660        net.core.optmem_max = 16777216
13670        net.core.rmem_default = 16777216
13680        net.core.rmem_max = 16777216
13690        net.core.wmem_default = 16777216
13700        net.core.wmem_max = 16777216
13710        net.ipv4.tcp_mem = 39363        209944  314904
13720        net.ipv4.tcp_no_metrics_save = 1
13730        net.ipv4.tcp_rmem = 8192        87380   16777216
13740        net.ipv4.tcp_sack = 0
13750        net.ipv4.tcp_timestamps = 0
13760        net.ipv4.tcp_wmem = 8192        65536   16777216
13770
```

13780 ○ LVM の設定を変更します。
13790
13800 a, s
```
sudo sed -i -e 's/obtain_device_list_from_udev =.*$/obtain_device_list_from_udev = 0/' /etc/lvm/lvm.conf
```
13810 a, s
```
sudo sed -i -e 's/use_blkid_wiping =.*$/use_blkid_wiping = 0/' /etc/lvm/lvm.conf
```
13820 a, s
```
sudo sed -i -e 's/use_lvmetad =.*$/use_lvmetad = 0/' /etc/lvm/lvm.conf
```
13830 a, s
```
sudo sed -i -e 's/use_lvmpolld =.*$/use_lvmpolld = 0/' /etc/lvm/lvm.conf
```
13840 a, s
```
sudo sed -i -e 's/write_cache_state =.*$/write_cache_state = 0/' /etc/lvm/lvm.conf
```
13850 a, s
```
sudo sed -i -e 's/readahead =.*$/readahead = "none"/' /etc/lvm/lvm.conf
```
13860 a, s
```
sudo patch --ignore-whitespace /etc/lvm/lvm.conf << 'EOF'
```
13870 a, s
```
diff -upr /etc/lvm/lvm.conf /etc/lvm/lvm.conf.new
```
13880 a, s
```
--- /etc/lvm/lvm.conf   2015-11-21 12:01:29.000000000 +0900
```
13890 a, s
```
+++ /etc/lvm/lvm.conf.new       2016-09-21 07:52:14.164259555 +0900
```
13900 a, s
```
@@ -139,6 +139,7 @@ devices {
```
13910 a, s
```
         #
```
13920 a, s
```
         # This configuration option has an automatic default value.
```
13930 a, s
```
         # filter = [ "a|.*/|" ]
```
13940 a, s
```
+filter = ["r|vg.*|", "a|sd.*|", "a|drbd.*|", "r|.*|"]
```
13950 a, s
13960 a, s
```
         # Configuration option devices/global_filter.
```
13970 a, s
```
         # Limit the block devices that are used by LVM system components.
```
13980 a, s
```
EOF
```
13990 a, s
```
sudo systemctl stop lvm2-lvmetad.socket
```
14000 a, s
```
sudo systemctl stop lvm2-lvmpolld.socket
```
14010 a, s
```
sudo systemctl disable lvm2-lvmetad.socket
```
14020 a, s
```
sudo systemctl disable lvm2-lvmpolld.socket
```
14030 a, s
```
sudo rm -f /etc/lvm/cache/.cache
```
14040 a, s
```
sudo cp -a /etc/lvm/lvm.conf /etc~/lvm/lvm.conf_$(date +%Y%m%d_%H%M%S)
```
14050
14060 ○ LVM の設定変更を初期化 RAM ディスクに反映します。
14070
14080 a, s
```
for i in /boot/initramfs-*
```
14090 a, s
```
do
```
14100 a, s
```
  KVER=$(echo $i | sed -n 's%/boot/initramfs-¥(.*¥).img%¥1%p')
```
14110 a, s
```
  if echo $KVER | grep -q -v rescue; then
```
14120 a, s
```
    if echo $KVER | grep -q -v kdump; then
```
14130 a, s
```
      sudo dracut --force /boot/initramfs-$KVER.img $KVER;
```
14140 a, s
```
    fi
```
14150 a, s
```
  fi
```
14160 a, s
```
done
```
14170

14180 ○ LVM 物理ボリュームを作成します。
14190
14200 a,s
```
sudo pvcreate /dev/sdc
```
14210
```
  Physical volume "/dev/sdc" successfully created
```
14220
14230 a,s
```
sudo pvcreate /dev/sdd
```
14240
```
  Physical volume "/dev/sdd" successfully created
```
14250
14260 a,s
```
sudo pvcreate /dev/sde
```
14270
```
  Physical volume "/dev/sde" successfully created
```
14280
14290 a,s
```
sudo pvcreate /dev/sdf
```
14300
```
  Physical volume "/dev/sdf" successfully created
```
14310
14320 ○ LVM ボリュームグループを作成します。
14330
14340 a,s
```
sudo vgcreate -s 4M vg0 /dev/sdc /dev/sdd /dev/sde /dev/sdf
```
14350
```
  Volume group "vg0" successfully created
```
14360
14370 ○ LVM 論理ボリュームを作成します。
14380
14390 a,s
```
sudo lvcreate --name lv-drbd0 --extents 90%FREE vg0
```
14400
```
  Logical volume "lv-drbd0" created.
```
14410
14420 ○ LVM の状態を確認します。
14430
14440 a,s
```
sudo pvs
```
14450
```
  PV         VG   Fmt  Attr PSize   PFree
```
14460
```
  /dev/sdc   vg0  lvm2 a--  100.00g     0
```
14470
```
  /dev/sdd   vg0  lvm2 a--  100.00g     0
```
14480
```
  /dev/sde   vg0  lvm2 a--  100.00g     0
```
14490
```
  /dev/sdf   vg0  lvm2 a--  100.00g 40.00g
```
14500
14510 a,s
```
sudo vgs
```
14520
```
  VG   #PV #LV #SN Attr   VSize   VFree
```
14530
```
  vg0    4   1   0 wz--n- 399.98g 40.00g
```
14540
14550 a,s
```
sudo lvs
```
14560
```
  LV       VG   Attr       LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
```
14570
```
  lv-drbd0 vg0  -wi-a----- 359.98g
```

14580
14590 ○ DRBD の設定ファイルを作成します。
14600
14610 a,s cat /etc/drbd.conf
14620 # You can find an example in /usr/share/doc/drbd.../drbd.conf.example
14630
14640 include "drbd.d/global_common.conf";
14650 include "drbd.d/*.res";
14660
14670 a,s cat << 'EOF' | sudo tee /etc/drbd.d/global_common.conf
14680 a,s global {
14690 a,s usage-count no;
14700 a,s }
14710 a,s common {
14720 a,s handlers {
14730 a,s pri-on-incon-degr "/usr/lib/drbd/notify-pri-on-incon-degr.sh; /usr/lib/drbd/notify-emergency-reboot.sh; echo 1 > /proc/sys/kernel/sysrq; echo b > /proc/sysrq-trigger; reboot -f";
14740 a,s local-io-error "/usr/lib/drbd/notify-io-error.sh; /usr/lib/drbd/notify-emergency-shutdown.sh; echo 1 > /proc/sys/kernel/sysrq; echo o > /proc/sysrq-trigger; halt -f";
14750 a,s fence-peer "/usr/lib/drbd/crm-fence-peer.sh";
14760 a,s before-resync-target "/usr/lib/drbd/snapshot-resync-target-lvm.sh -p 4";
14770 a,s after-resync-target "/usr/lib/drbd/unsnapshot-resync-target-lvm.sh; /usr/lib/drbd/crm-unfence-peer.sh";
14780 a,s }
14790 a,s startup {
14800 a,s #wfc# wfc-timeout 10;
14810 a,s #wfc# degr-wfc-timeout 10;
14820 a,s #wfc# outdated-wfc-timeout 10;
14830 a,s }
14840 a,s disk {
14850 a,s on-io-error detach;
14860 a,s fencing resource-only;
14870 a,s al-extents 6433;
14880 a,s c-plan-ahead 20;
14890 a,s c-delay-target 100;
14900 a,s c-fill-target 0;
14910 a,s c-max-rate 100M;
14920 a,s c-min-rate 1M;
14930 a,s }
14940 a,s net {
14950 a,s protocol C;
14960 a,s max-buffers 128k;
14970 a,s sndbuf-size 0;

```
14980 a,s       rcvbuf-size 0;
14990 a,s       cram-hmac-alg sha1;
15000 a,s       shared-secret "password";
15010 a,s       congestion-fill 100M;
15020 a,s       congestion-extents 2000;
15030 a,s       csums-alg md5;
15040 a,s       verify-alg md5;
15050 a,s       use-rle yes;
15060 a,s     }
15070 a,s   }
15080 a,s   EOF
15090 a,s   sudo cp -a /etc/drbd.d/global_common.conf /etc~/drbd.d/global_common.conf_$(date +%Y%m%d_%H%M%S)
15100 a,s
15110 a,s   cat << 'EOF' | sudo tee /etc/drbd.d/r0.res
15120 a,s   resource r0 {
15130 a,s     volume 0 {
15140 a,s       device /dev/drbd0;
15150 a,s       disk /dev/vg0/lv-drbd0;
15160 a,s       meta-disk internal;
15170 a,s     }
15180 a,s     on iscsitgt01a.example.com {
15190 a,s       address 192.168.1.2:7788;
15200 a,s     }
15210 a,s     on iscsitgt01s.example.com {
15220 a,s       address 192.168.1.3:7788;
15230 a,s     }
15240 a,s   }
15250 a,s   EOF
15260
15270   ○   DRBD リソースを初期化します。
15280
15290 a,s   sudo drbdadm create-md r0
15300       initializing activity log
15310       NOT initializing bitmap
15320       Writing meta data...
15330       New drbd meta data block successfully created.
15340
15350   ○   targetcli から exit する際に自動的に設定を save する挙動を無効化します。
15360
15370 a,s   sudo targetcli set global auto_save_on_exit=false
```

```
15380       Warning: Could not load preferences file /root/.targetcli/prefs.bin.
15390       Parameter auto_save_on_exit is now 'false'.
15400
15410   ○   targetcli から target を追加する際に自動的に portal が作成される挙動を無効化します。
15420
15430 a,s   sudo targetcli set global auto_add_default_portal=false
15440       Parameter auto_add_default_portal is now 'false'.
15450
15460   ○   targetcli コマンドのデフォルト設定を確認します。
15470
15480 a,s   sudo targetcli get global
15490       GLOBAL CONFIG GROUP
15500       ===================
15510       auto_add_default_portal=false
15520       ----------------------------
15530       If true, adds a portal listening on all IPs to new targets.
15540
15550       auto_add_mapped_luns=true
15560       -------------------------
15570       If true, automatically create node ACLs mapped LUNs after creating a new target LUN or a new node ACL
15580
15590       auto_cd_after_create=false
15600       --------------------------
15610       If true, changes current path to newly created objects.
15620
15630       auto_enable_tpgt=true
15640       ---------------------
15650       If true, automatically enables TPGTs upon creation.
15660
15670       auto_save_on_exit=false
15680       -----------------------
15690       If true, saves configuration on exit.
15700
15710       color_command=cyan
15720       ------------------
15730       Color to use for command completions.
15740
15750       color_default=none
15760       ------------------
15770       Default text display color.
```

```
15780
15790       color_keyword=cyan
15800       ------------------
15810       Color to use for keyword completions.
15820
15830       color_mode=true
15840       ---------------
15850       Console color display mode.
15860
15870       color_parameter=magenta
15880       -----------------------
15890       Color to use for parameter completions.
15900
15910       color_path=magenta
15920       ------------------
15930       Color to use for path completions
15940
15950       export_backstore_name_as_model=true
15960       -----------------------------------
15970       If true, the backstore name is used for the scsi inquiry model name.
15980
15990       logfile=/root/.targetcli/log.txt
16000       --------------------------------
16010       Logfile to use.
16020
16030       loglevel_console=info
16040       ---------------------
16050       Log level for messages going to the console.
16060
16070       loglevel_file=debug
16080       -------------------
16090       Log level for messages going to the log file.
16100
16110       prompt_length=30
16120       ----------------
16130       Max length of the shell prompt path, 0 for infinite.
16140
16150       tree_max_depth=0
16160       ----------------
16170       Maximum depth of displayed node tree.
```

```
16180
16190       tree_round_nodes=true
16200       ---------------------
16210       Tree node display style.
16220
16230       tree_show_root=true
16240       -------------------
16250       Whether or not to display tree root.
16260
16270       tree_status_mode=true
16280       ---------------------
16290       Whether or not to display status in tree.
16300
```

○ LIO のリソース・エージェントを作成します。

```
16320
16330 a,s   cat << 'EOF_LIO' | sudo tee /usr/lib/ocf/resource.d/heartbeat/LIO
16340 a,s   #!/bin/bash
16350 a,s   #
16360 a,s   #     LIO OCF RA. manages iSCSI target LIO.
16370 a,s   #
16380 a,s   #   (c) 2009-2010 Florian Haas, Dejan Muhamedagic,
16390 a,s   #                 and Linux-HA contributors
16400 a,s   #
16410 a,s   #      modified by Katsuaki Hamada (hamada@pc-office.net), 21 Nov 2016
16420 a,s   #
16430 a,s   # This program is free software; you can redistribute it and/or modify
16440 a,s   # it under the terms of version 2 of the GNU General Public License as
16450 a,s   # published by the Free Software Foundation.
16460 a,s   #
16470 a,s   # This program is distributed in the hope that it would be useful, but
16480 a,s   # WITHOUT ANY WARRANTY; without even the implied warranty of
16490 a,s   # MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
16500 a,s   #
16510 a,s   # Further, this software is distributed without any warranty that it is
16520 a,s   # free of the rightful claim of any third person regarding infringement
16530 a,s   # or the like.  Any license provided herein, whether implied or
16540 a,s   # otherwise, applies only to this software file.  Patent licenses, if
16550 a,s   # any, provided herein do not apply to combinations of this program with
16560 a,s   # other software, or any other product whatsoever.
16570 a,s   #
```

```
16580 a,s   # You should have received a copy of the GNU General Public License
16590 a,s   # along with this program; if not, write the Free Software Foundation,
16600 a,s   # Inc., 59 Temple Place - Suite 330, Boston MA 02111-1307, USA.
16610 a,s   #
16620 a,s
16630 a,s   ######################################################################
16640 a,s   # Initialization:
16650 a,s   : ${OCF_FUNCTIONS_DIR=${OCF_ROOT}/lib/heartbeat}
16660 a,s   . ${OCF_FUNCTIONS_DIR}/ocf-shellfuncs
16670 a,s
16680 a,s   # Lockfile, used for selecting a target ID
16690 a,s   LOCKFILE=${HA_RSCTMP}/target.lock
16700 a,s   ######################################################################
16710 a,s
16720 a,s   meta_data() {
16730 a,s           cat <<END
16740 a,s   <?xml version="1.0"?>
16750 a,s   <!DOCTYPE resource-agent SYSTEM "ra-api-1.dtd">
16760 a,s   <resource-agent name="LIO" version="1.0">
16770 a,s   <version>0.9</version>
16780 a,s
16790 a,s   <longdesc lang="en">
16800 a,s   Manages iSCSI target LIO. An iSCSI target is a collection of SCSI Logical
16810 a,s   Units (LUs) exported via a daemon that speaks the iSCSI protocol.
16820 a,s   </longdesc>
16830 a,s   <shortdesc lang="en">iSCSI target export agent</shortdesc>
16840 a,s
16850 a,s   <parameters>
16860 a,s   <parameter name="iqn" required="0" unique="1">
16870 a,s   <longdesc lang="en">
16880 a,s   The target iSCSI Qualified Name (IQN). Should follow the conventional
16890 a,s   iqn.yyyy-mm.&lt;reversed domain name&gt;[:identifier] syntax.
16900 a,s   </longdesc>
16910 a,s   <shortdesc lang="en">iSCSI target IQN</shortdesc>
16920 a,s   <content type="string" />
16930 a,s   </parameter>
16940 a,s   </parameters>
16950 a,s
16960 a,s   <actions>
16970 a,s   <action name="start" timeout="10" />
```

```
16980 a,s    <action name="stop" timeout="10" />
16990 a,s    <action name="status" timeout="10" interval="10" depth="0" />
17000 a,s    <action name="monitor" timeout="10" interval="10" depth="0" />
17010 a,s    <action name="meta-data" timeout="5" />
17020 a,s    <action name="validate-all" timeout="10" />
17030 a,s    </actions>
17040 a,s    </resource-agent>
17050 a,s    END
17060 a,s    }
17070 a,s
17080 a,s    ######################################################################
17090 a,s
17100 a,s    LIO_usage() {
17110 a,s      cat <<END
17120 a,s    usage: $0 {start|stop|status|monitor|validate-all|meta-data}
17130 a,s
17140 a,s    Expects to have a fully populated OCF RA-compliant environment set.
17150 a,s    END
17160 a,s    }
17170 a,s
17180 a,s    LIO_start() {
17190 a,s      LIO_monitor
17200 a,s      [ $? =  $OCF_SUCCESS ] && return $OCF_SUCCESS
17210 a,s      /usr/bin/targetctl restore
17220 a,s      LIO_monitor
17230 a,s    }
17240 a,s
17250 a,s    LIO_stop() {
17260 a,s      LIO_monitor
17270 a,s      [ $? -eq $OCF_NOT_RUNNING ] || /usr/bin/targetctl clear
17280 a,s      return $OCF_SUCCESS
17290 a,s    }
17300 a,s
17310 a,s    LIO_monitor() {
17320 a,s      for i in /sys/kernel/config/target/iscsi/iqn.*
17330 a,s      do
17340 a,s        [ -d $i ] && [ $(cat $i/tpgt_1/enable) -eq 1 ] && return $OCF_SUCCESS
17350 a,s      done
17360 a,s      return $OCF_NOT_RUNNING
17370 a,s    }
```

```
17380 a,s
17390 a,s   LIO_validate() {
17400 a,s     if ! ocf_is_probe; then
17410 a,s       # Do we have all required binaries?
17420 a,s       check_binary targetctl
17430 a,s     fi
17440 a,s     return $OCF_SUCCESS
17450 a,s   }
17460 a,s
17470 a,s   case $1 in
17480 a,s     meta-data)  meta_data; exit $OCF_SUCCESS;;
17490 a,s     usage|help) LIO_usage; exit $OCF_SUCCESS;;
17500 a,s   esac
17510 a,s
17520 a,s   # Everything except usage and meta-data must pass the validate test
17530 a,s   LIO_validate
17540 a,s
17550 a,s   case $__OCF_ACTION in
17560 a,s     start)          LIO_start;;
17570 a,s     stop)           LIO_stop;;
17580 a,s     monitor|status) LIO_monitor;;
17590 a,s     reload)         ocf_log err "Reloading..."; LIO_start;;
17600 a,s     validate-all)   ;;
17610 a,s     *)              LIO_usage; exit $OCF_ERR_UNIMPLEMENTED;;
17620 a,s   esac
17630 a,s   rc=$?
17640 a,s   ocf_log debug "${OCF_RESOURCE_INSTANCE} $__OCF_ACTION : $rc"
17650 a,s   exit $rc
17660 a,s   EOF_LIO
17670 a,s   sudo chmod 755 /usr/lib/ocf/resource.d/heartbeat/LIO
17680
```

17690 ○ VIP に関するリソース・エージェント (IPaddr2) の名前を変更します。

```
17700
17710 a,s   sed -e 's/IPaddr2/VIP/g' /usr/lib/ocf/resource.d/heartbeat/IPaddr2 | sudo tee /usr/lib/ocf/resource.d/heartbeat/VIP > /dev/null
17720 a,s   sudo chmod 755 /usr/lib/ocf/resource.d/heartbeat/VIP
17730
```

17740 ※ LVM, LIO, VIP リソース・エージェント名文字数を統一し、「sudo pcs status」等の実行結果を見やすくします。
17750 ※ サポート問い合わせ時は、IPaddr2 を上記のコマンドで変更している点を伝えないと話が通じないものと思われます。

17760
17770 ○ pcs の利用環境を整えます。

```
17780
17790 a,s    echo 'password' | sudo passwd --stdin hacluster
17800        Changing password for user hacluster.
17810        passwd: all authentication tokens updated successfully.
17820
17830 a,s    sudo cp -a /etc/shadow    /etc~/shadow_$(date +%Y%m%d_%H%M%S)
17840 a,s    sudo cp -a /etc/shadow-   /etc~/shadow-_$(date +%Y%m%d_%H%M%S)
17850
17860 a,s    sudo usermod -a -G haclient admin
17870
17880 a,s    id admin
17890        uid=1000(admin) gid=1000(admin) groups=1000(admin),10(wheel),189(haclient)
17900
17910 a,s    sudo usermod -a -G haclient monitor
17920
17930 a,s    id monitor
17940        uid=1001(monitor) gid=1001(monitor) groups=1001(monitor),189(haclient)
17950
17960 a,s    sudo cp -a /etc/group    /etc~/group_$(date +%Y%m%d_%H%M%S)
17970 a,s    sudo cp -a /etc/group-   /etc~/group-_$(date +%Y%m%d_%H%M%S)
17980
17990 a,s    sudo systemctl start pcsd
18000 a,s    sudo systemctl enable pcsd
18010        Created symlink from /etc/systemd/system/multi-user.target.wants/pcsd.service to /usr/lib/systemd/system/pcsd.service.
18020
18030   ○    Corosync のサービス設定を変更します。
18040
18050 a,s    sed -e 's/^#Restart=on-failure.*$/Restart=on-failure/' ¥
18060 a,s     -e 's/^#RestartSec=.*$/RestartSec=70/' ¥
18070 a,s     -e 's%^#ExecStartPre=/sbin/modprobe softdog soft_margin=.*$%ExecStartPre=/sbin/modprobe softdog soft_margin=6%' ¥
18080 a,s     /usr/lib/systemd/system/corosync.service | sudo tee /etc/systemd/system/corosync.service
18090        [Unit]
18100        Description=Corosync Cluster Engine
18110        ConditionKernelCommandLine=!nocluster
18120        Requires=network-online.target
18130        After=network-online.target
18140
18150        [Service]
18160        ExecStart=/usr/share/corosync/corosync start
18170        ExecStop=/usr/share/corosync/corosync stop
```

```
18180       Type=forking
18190
18200       # The following config is for corosync with enabled watchdog service.
18210       #
18220       #  When corosync watchdog service is being enabled and using with
18230       #  pacemaker.service, and if you want to exert the watchdog when a
18240       #  corosync process is terminated abnormally,
18250       #  uncomment the line of the following Restart= and RestartSec=.
18260       Restart=on-failure
18270       #  Specify a period longer than soft_margin as RestartSec.
18280       RestartSec=70
18290       #  rewrite according to environment.
18300       ExecStartPre=/sbin/modprobe softdog soft_margin=6
18310
18320       [Install]
18330       WantedBy=multi-user.target
18340
18350           ※  カーネル内のソフトウェア watchdog 機能を有効化します。
18360           ※  Corosync プロセス障害検知時間を6秒以内とします。
18370
18380 a,s   cat /etc/sysconfig/corosync
18390       # Corosync init script configuration file
18400
18410       # COROSYNC_INIT_TIMEOUT specifies number of seconds to wait for corosync
18420       # initialization (default is one minute).
18430       COROSYNC_INIT_TIMEOUT=60
18440
18450       # COROSYNC_OPTIONS specifies options passed to corosync command
18460       # (default is no options).
18470       # See "man corosync" for detailed descriptions of the options.
18480       COROSYNC_OPTIONS=""
18490
18500   ○   Pacemaker のサービス設定を変更します。
18510
18520 a,s   sed -e "s%^# ExecStopPost=/bin/sh -c 'pidof crmd || killall -TERM corosync'$%ExecStopPost=/bin/sh -c 'pidof crmd || killall -TERM corosync'%" ¥
18530 a,s    /usr/lib/systemd/system/pacemaker.service | sudo tee /etc/systemd/system/pacemaker.service
18540       [Unit]
18550       Description=Pacemaker High Availability Cluster Manager
18560
18570       After=dbus.service
```

```
18580       After=basic.target
18590       After=syslog.service
18600       After=network.target
18610       After=corosync.service
18620
18630       Requires=dbus.service
18640       Requires=basic.target
18650       Requires=corosync.service
18660       # if you use crm_mon, uncomment the line below.
18670       # Wants=crm_mon.service
18680
18690       [Install]
18700       WantedBy=multi-user.target
18710
18720       [Service]
18730       Type=simple
18740       KillMode=process
18750       NotifyAccess=main
18760       EnvironmentFile=-/etc/sysconfig/pacemaker
18770       EnvironmentFile=-/etc/sysconfig/sbd
18780       SuccessExitStatus=100
18790
18800       ExecStart=/usr/sbin/pacemakerd -f
18810
18820       # If pacemakerd doesn't stop, its probably waiting on a cluster
18830       # resource.  Sending -KILL will just get the node fenced
18840       SendSIGKILL=no
18850
18860       # If we ever hit the StartLimitInterval/StartLimitBurst limit and the
18870       # admin wants to stop the cluster while pacemakerd is not running, it
18880       # might be a good idea to enable the ExecStopPost directive below.
18890       #
18900       # Although the node will likely end up being fenced as a result so its
18910       # not on by default
18920       #
18930       # ExecStopPost=/usr/bin/killall -TERM crmd attrd fenced cib pengine lrmd
18940
18950       # If you want Corosync to stop whenever Pacemaker is stopped,
18960       # uncomment the next line too:
18970       #
```

```
18980       ExecStopPost=/bin/sh -c 'pidof crmd || killall -TERM corosync'
18990
19000       # Uncomment this for older versions of systemd that didn't support
19010       # TimeoutStopSec
19020       # TimeoutSec=30min
19030
19040       # Pacemaker can only exit after all managed services have shut down
19050       # A HA database could conceivably take even longer than this
19060       TimeoutStopSec=30min
19070       TimeoutStartSec=60s
19080
19090       # Restart options include: no, on-success, on-failure, on-abort or always
19100       Restart=on-failure
19110
19120       # crm_perror() writes directly to stderr, so ignore it here
19130       # to avoid double-logging with the wrong format
19140       StandardError=null
19150
19160       # if you use crm_mon, uncomment the line below.
19170       # ExecStopPost=/bin/sh -c 'systemctl status crm_mon >/dev/null && systemctl stop crm_mon'
19180
19190           ※  Pacemaker サービス停止時に Corosync サービスを停止します。
19200
19210 a, s   sudo sed -i -e 's/^# PCMK_fail_fast=.*$/PCMK_fail_fast=yes/' /etc/sysconfig/pacemaker
19220 a, s   sudo cp -a /etc/sysconfig/pacemaker /etc~/sysconfig/pacemaker_$(date +%Y%m%d_%H%M%S)
19230 a, s   cat /etc/sysconfig/pacemaker
19240       # For non-systemd based systems, prefix export to each enabled line
19250
19260       # Turn on special handling for CMAN clusters in the init script
19270       # Without this, fenced (and by inference, cman) cannot reliably be made to shut down
19280       # PCMK_STACK=cman
19290
19300       #==#==# Variables that control logging
19310
19320       # Enable debug logging globally or per-subsystem
19330       # Multiple subsystems may me listed separated by commas
19340       # eg. PCMK_debug=crmd,pengine
19350       # PCMK_debug=yes|no|crmd|pengine|cib|stonith-ng|attrd|pacemakerd
19360
19370       # Send INFO (and higher) messages to the named log file
```

```
19380       # Additional messages may also appear here depending on any configured debug and trace settings
19390       # By default Pacemaker will inherit the logfile specified in corosync.conf
19400       # PCMK_logfile=/var/log/pacemaker.log
19410
19420       # Specify an alternate syslog target for NOTICE (and higher) messages
19430       # Use 'none' to disable - not recommended
19440       # The default value is 'daemon'
19450       # PCMK_logfacility=none|daemon|user|local0|local1|local2|local3|local4|local5|local6|local7
19460
19470       # Send all messages up-to-and-including the configured priority to syslog
19480       # A value of 'info' will be far too verbose for most installations and 'debug' is almost certain to send you blind
19490       # The default value is 'notice'
19500       # PCMK_logpriority=emerg|alert|crit|error|warning|notice|info|debug
19510
19520       # Log all messages from a comma-separated list of functions
19530       # PCMK_trace_functions=function1,function2,function3
19540
19550       # Log all messages from a comma-separated list of files (no path)
19560       # Supports wildcards eg. PCMK_trace_files=prefix*.c
19570       # PCMK_trace_files=file.c,other.h
19580
19590       # Log all messages matching comma-separated list of formats
19600       # PCMK_trace_formats="Sent delete %d"
19610
19620       # Log all messages from a comma-separated list of tags
19630       # PCMK_trace_tags=tag1,tag2
19640
19650       # Dump the blackbox whenever the message at function and line is printed
19660       # eg. PCMK_trace_blackbox=te_graph_trigger:223,unpack_clone:81
19670       # PCMK_trace_blackbox=fn:line,fn2:line2,...
19680
19690       # Enable blackbox logging globally or per-subsystem
19700       # The blackbox contains a rolling buffer of all logs (including info+debug+trace)
19710       # and is written after a crash, assertion failure and/or when SIGTRAP is received
19720       #
19730       # The blackbox recorder can also be enabled for Pacemaker daemons at runtime by
19740       # sending SIGUSR1 (or SIGTRAP), and disabled by sending SIGUSR2
19750       #
19760       # Multiple subsystems may me listed separated by commas
19770       # eg. PCMK_blackbox=crmd,pengine
```

```
19780       # PCMK_blackbox=yes|no|crmd|pengine|cib|stonith-ng|attrd|pacemakerd
19790
19800       #==#==# Advanced use only
19810
19820       # Enable this for compatibility with older corosync (prior to 2.0)
19830       # based clusters which used the nodes uname as its uuid also
19840       # PCMK_uname_is_uuid=no
19850
19860       # Specify an alternate location for RNG schemas and XSL transforms
19870       # Mostly only useful for developer testing
19880       # PCMK_schema_directory=/some/path
19890
19900       # Enable this for rebooting this machine at the time of process (subsystem) failure
19910       PCMK_fail_fast=yes
19920
19930       #==#==# Pacemaker Remote
19940       # Use a custom directory for finding the authkey.
19950       # PCMK_authkey_location=/etc/pacemaker/authkey
19960       #
19970       # Specify a custom port for Pacemaker Remote connections
19980       # PCMK_remote_port=3121
19990
20000       #==#==# IPC
20010
20020       # Force use of a particular class of IPC connection
20030       # PCMK_ipc_type=shared-mem|socket|posix|sysv
20040
20050       # Specify an IPC buffer size in bytes
20060       # Useful when connecting to really big clusters that exceed the default 20k buffer
20070       # PCMK_ipc_buffer=20480
20080
20090       #==#==# Profiling and memory leak testing
20100
20110       # Variables for running child daemons under valgrind and/or checking for memory problems
20120       # G_SLICE=always-malloc
20130       # MALLOC_PERTURB_=221 # or 0
20140       # MALLOC_CHECK_=3     # or 0,1,2
20150       # PCMK_valgrind_enabled=yes
20160       # PCMK_valgrind_enabled=cib,crmd
20170       # PCMK_callgrind_enabled=yes
```

```
20180       # PCMK_callgrind_enabled=cib,crmd
20190       # VALGRIND_OPTS="--leak-check=full --trace-children=no --num-callers=25 --log-file=/var/lib/pacemaker/valgrind-%p
20200        --suppressions=/usr/share/pacemaker/tests/valgrind-pcmk.suppressions --gen-suppressions=all"
20210
20220           ※  Pacemaker の内部プロセス障害をノード障害として扱うようにします。
20230
20240   ○   Pacemaker のリソース設定スクリプトを作成します。
20250
20260 a,s   cat << 'EOF' | sudo tee /etc/ha.d/crm.sh
20270 a,s   #!/bin/bash
20280 a,s   pcs property set batch-limit=30
20290 a,s   pcs property set cluster-delay=60
20300 a,s   pcs property set cluster-recheck-interval=15min
20310 a,s   pcs property set crmd-finalization-timeout=30min
20320 a,s   pcs property set crmd-integration-timeout=3min
20330 a,s   pcs property set crmd-transition-delay=0s
20340 a,s   pcs property set dc-deadtime=20s
20350 a,s   pcs property set default-action-timeout=20
20360 a,s   pcs property set election-timeout=2min
20370 a,s   pcs property set enable-acl=true --force
20380 a,s   pcs property set enable-startup-probes=true
20390 a,s   pcs property set is-managed-default=true
20400 a,s   pcs property set load-threshold=80%
20410 a,s   pcs property set maintenance-mode=false
20420 a,s   pcs property set migration-limit=-1
20430 a,s   pcs property set no-quorum-policy=ignore
20440 a,s   pcs property set node-action-limit=0
20450 a,s   pcs property set node-health-green=0
20460 a,s   pcs property set node-health-red=-INFINITY
20470 a,s   pcs property set node-health-strategy=none
20480 a,s   pcs property set node-health-yellow=0
20490 a,s   pcs property set notification-agent=/dev/null
20500 a,s   pcs property set pe-error-series-max=100
20510 a,s   pcs property set pe-input-series-max=100
20520 a,s   pcs property set pe-warn-series-max=100
20530 a,s   pcs property set placement-strategy=default
20540 a,s   pcs property set remove-after-stop=false
20550 a,s   pcs property set shutdown-escalation=20min
20560 a,s   pcs property set start-failure-is-fatal=true
20570 a,s   pcs property set startup-fencing=true
```

```
20580 a, s    pcs property set stonith-action=reboot
20590 a, s    pcs property set stonith-enabled=false
20600 a, s    pcs property set stonith-timeout=60
20610 a, s    pcs property set stop-all-resources=false
20620 a, s    pcs property set stop-orphan-actions=true
20630 a, s    pcs property set stop-orphan-resources=true
20640 a, s    pcs property set symmetric-cluster=true
20650 a, s
20660 a, s    pcs resource defaults resource-stickiness=200 migration-threshold=2
20670 a, s
20680 a, s    pcs acl role create write-access description="Full access" write xpath /cib
20690 a, s    pcs acl role create read-only description="Read access to cluster" read xpath /cib
20700 a, s
20710 a, s    pcs acl user create admin write-access
20720 a, s    pcs acl user create monitor read-only
20730 a, s
20740 a, s    pcs resource create p_drbd_r0 ocf:linbit:drbd ¥
20750 a, s      params drbd_resource=r0 ¥
20760 a, s      op start                            timeout=240 ¥
20770 a, s      op monitor interval=10 role=Master  timeout=20 ¥
20780 a, s      op monitor interval=20 role=Slave   timeout=20 ¥
20790 a, s      op notify                           timeout=90 ¥
20800 a, s      op stop                             timeout=100 ¥
20810 a, s      op promote                          timeout=90 ¥
20820 a, s      op demote                           timeout=90
20830 a, s
20840 a, s    pcs resource master ms_drbd_r0 p_drbd_r0 ¥
20850 a, s      meta master-max=1 master-node-max=1 clone-max=2 ¥
20860 a, s      clone-node-max=1 notify=true target-role=Started ¥
20870 a, s      is-managed=true
20880 a, s
20890 a, s    pcs resource create p_lvm ocf:heartbeat:LVM ¥
20900 a, s      params volgrpname=vg1 ¥
20910 a, s      op start              timeout=30 ¥
20920 a, s      op monitor interval=5 timeout=10 ¥
20930 a, s      op stop               timeout=30
20940 a, s
20950 a, s    pcs resource create p_lio ocf:heartbeat:LIO ¥
20960 a, s      op start              timeout=10 ¥
20970 a, s      op monitor interval=5 timeout=5 ¥
```

```
20980 a,s     op stop                timeout=10
20990 a,s
21000 a,s   pcs resource create p_vip ocf:heartbeat:VIP ¥
21010 a,s     params ip=10.110.88.59 cidr_netmask=26 nic=bond0 iflabel=1 arp_interval=200 arp_count=5 ¥
21020 a,s     op start               timeout=20 ¥
21030 a,s     op monitor interval=5 timeout=10 ¥
21040 a,s     op stop                timeout=20
21050 a,s
21060 a,s   pcs resource group add g_tgt p_lvm p_lio p_vip
21070 a,s
21080 a,s   pcs constraint location add lc_tgt g_tgt iscsitgt01a.example.com 100
21090 a,s
21100 a,s   pcs constraint colocation add g_tgt ¥
21110 a,s     ms_drbd_r0 INFINITY with-rsc-role=Master
21120 a,s
21130 a,s   pcs constraint order promote ms_drbd_r0 then start p_lvm
21140 a,s   EOF
21150 a,s   sudo chmod 755 /etc/ha.d/crm.sh
21160 a,s   sudo cp -a /etc{,~}/ha.d/crm.sh
21170
21180       ※  ここからの作業は、Active 機と Stand-by 機が連動して動作していく前提の操作となります。
21190
21200   ○   Active 機と Stand-by 機の間の疎通を確認します。
21210
21220 a,s   ping -c 1 -M do -s 8972 10.110.88.57 || echo Error
21230       PING 10.110.88.57 (10.110.88.57) 8972(9000) bytes of data.
21240       8980 bytes from 10.110.88.57: icmp_seq=1 ttl=64 time=0.136 ms
21250
21260       --- 10.110.88.57 ping statistics ---
21270       1 packets transmitted, 1 received, 0% packet loss, time 0ms
21280       rtt min/avg/max/mdev = 0.136/0.136/0.136/0.000 ms
21290
21300 a,s   traceroute -F 10.110.88.57 8972
21310       traceroute to 10.110.88.57 (10.110.88.57), 30 hops max, 8972 byte packets
21320        1  iscsitgt01a.example.com (10.110.88.57)  0.303 ms  0.265 ms  0.256 ms
21330
21340 a,s   ping -c 1 -M do -s 8972 10.110.88.58 || echo Error
21350 a,s   traceroute -F 10.110.88.58 8972
21360
21370 a,s   ping -c 1 -M do -s 8972 192.168.1.2 || echo Error
```

```
21380 a,s    traceroute -F 192.168.1.2 8972
21390
21400 a,s    ping -c 1 -M do -s 8972 192.168.1.3 || echo Error
21410 a,s    traceroute -F 192.168.1.3 8972
21420
21430   ○    Active 機で ssh 鍵を作成し、Stand-by 機にコピーします。
21440
21450    a   ssh-keygen -q -f ~/.ssh/id_rsa -N ""
21460    a   mv -f ~/.ssh/id_rsa.pub ~/.ssh/authorized_keys
21470    a   scp -pr .ssh/ iscsitgt01s:
21480        The authenticity of host 'iscsitgt01s (10.110.88.58)' can't be established.
21490        ECDSA key fingerprint is cf:3a:39:91:fc:c9:ac:5c:4e:16:38:72:97:88:28:b2.
21500    a   Are you sure you want to continue connecting (yes/no)? yes
21510        Warning: Permanently added 'iscsitgt01s,10.110.88.58' (ECDSA) to the list of known hosts.
21520    a   admin@iscsitgt01s's password: ********
21530        id_rsa                                        100% 1679     1.6KB/s   00:00
21540        authorized_keys                               100%  411     0.4KB/s   00:00
21550        known_hosts                                   100%  186     0.2KB/s   00:00
21560
21570   ○    Active 機と Stand-by 機で、ssh 鍵を root アカウント用にコピーします。
21580
21590 a,s    sudo cp -a .ssh/ /root/
21600 a,s    sudo chown -R root:root /root/.ssh
21610
21620   ○    Active 機と Stand-by 機でほぼ同時に DRBD サービスを起動します。
21630
21640 a,s    sudo systemctl start drbd.service
21650
21660   ○    Stand-by 機で DRBD の状態をワッチします。
21670
21680    s   watch cat /proc/drbd
21690        Every 2.0s: cat /proc/drbd                          Fri Nov 25 16:35:43 2016
21700
21710        version: 8.4.5 (api:1/proto:86-101)
21720        srcversion: 1AEFF755B8BD61B81A0AF27
21730         0: cs:Connected ro:Secondary/Secondary ds:Inconsistent/Inconsistent C r-----
21740            ns:0 nr:0 dw:0 dr:0 al:0 bm:0 lo:0 pe:0 ua:0 ap:0 ep:1 wo:f oos:377459420
21750
21760   ○    Active 機で DRBD の初期同期を開始します。
21770
```

```
21780   a   sudo drbdadm primary --force all
21790
21800   ○   Stand-by 機で DRBD の状態を確認します。
21810
21820       Every 2.0s: cat /proc/drbd                          Fri Nov 25 16:36:21 2016
21830
21840       version: 8.4.5 (api:1/proto:86-101)
21850       srcversion: 1AEFF755B8BD61B81A0AF27
21860        0: cs:SyncTarget ro:Secondary/Primary ds:Inconsistent/UpToDate C r-----
21870           ns:0 nr:0 dw:0 dr:355856 al:0 bm:0 lo:0 pe:0 ua:0 ap:0 ep:1 wo:f oos:377103564
21880               [>....................] sync'ed:  0.1% (368264/368612)M
21890               finish: 0:52:57 speed: 118,616 (118,616) want: 102,400 K/sec
21900
21910       ※  この状態でも、Active 機側で作業を続行できます。今回は、初期同期の完了を待つことにします。
21920
21930       Every 2.0s: cat /proc/drbd                          Fri Nov 25 17:44:37 2016
21940
21950       version: 8.4.5 (api:1/proto:86-101)
21960       srcversion: 1AEFF755B8BD61B81A0AF27
21970        0: cs:Connected ro:Secondary/Primary ds:UpToDate/UpToDate C r-----
21980           ns:0 nr:0 dw:0 dr:377459420 al:0 bm:0 lo:0 pe:0 ua:0 ap:0 ep:1 wo:f oos:0
21990
22000       ※  「自機/対向機」がともに「UpToDate/UpToDate」となっているのが正常な状態です。
22010
22020   ○   Active 機で DRBD デバイス上に LVM を構成します。
22030
22040   a   sudo pvcreate /dev/drbd0
22050         Physical volume "/dev/drbd0" successfully created
22060
22070   a   sudo vgcreate -s 4M vg1 /dev/drbd0
22080         Volume group "vg1" successfully created
22090
22100   a   sudo lvcreate --name lv-lun0000 --extents 90%VG vg1
22110         Logical volume "lv-lun0000" created.
22120
22130   a   sudo lvcreate --name lv-lun0001 --extents 2%VG vg1
22140         Logical volume "lv-lun0001" created.
22150
22160   a   sudo lvcreate --name lv-lun0002 --extents 2%VG vg1
22170         Logical volume "lv-lun0002" created.
```

```
22180
22190   a   sudo lvcreate --name lv-lun0003 --extents 2%VG vg1
22200         Logical volume "lv-lun0003" created.
22210
22220   a   sudo pvs
22230         PV         VG   Fmt  Attr PSize   PFree
22240         /dev/drbd0 vg1  lvm2 a--  359.97g 14.40g
22250         /dev/sdc1  vg0  lvm2 a--  100.00g     0
22260         /dev/sdd1  vg0  lvm2 a--  100.00g     0
22270         /dev/sde1  vg0  lvm2 a--  100.00g     0
22280         /dev/sdf1  vg0  lvm2 a--  100.00g 40.00g
22290
22300   a   sudo vgs
22310         VG   #PV #LV #SN Attr   VSize   VFree
22320         vg0    4   1   0 wz--n- 399.98g 40.00g
22330         vg1    1   4   0 wz--n- 359.97g 14.40g
22340
22350   a   sudo lvs
22360         LV         VG   Attr       LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
22370         lv-drbd0   vg0  -wi-ao---- 359.98g
22380         lv-lun0000 vg1  -wi-a----- 323.97g
22390         lv-lun0001 vg1  -wi-a-----   7.20g
22400         lv-lun0002 vg1  -wi-a-----   7.20g
22410         lv-lun0003 vg1  -wi-a-----   7.20g
22420
22430   ○   Active 機で、targetcli から状態を確認します。
22440
22450   a   sudo targetcli ls /
22460       o- / ..................................................................... [...]
22470         o- backstores ......................................................... [...]
22480         | o- block ............................................ [Storage Objects: 0]
22490         | o- fileio ........................................... [Storage Objects: 0]
22500         | o- pscsi ............................................ [Storage Objects: 0]
22510         | o- ramdisk .......................................... [Storage Objects: 0]
22520         o- iscsi ....................................................... [Targets: 0]
22530         o- loopback .................................................... [Targets: 0]
22540
22550   ○   Active 機で、IQN を定義します。
22560
22570   a   sudo targetcli /iscsi create iqn.2016-09.com.example:iscsitgt01-0000
```

```
22580       Created target iqn.2016-09.com.example:iscsitgt01-0000.
22590       Created TPG 1.
22600
22610   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1 set attribute default_cmdsn_depth = 128
22620       Parameter default_cmdsn_depth is now '128'.
22630
22640   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1 set parameter MaxConnections = 1
22650       Parameter MaxConnections is now '1'.
22660
22670   a   sudo targetcli /iscsi create iqn.2016-09.com.example:iscsitgt01-0001
22680       Created target iqn.2016-09.com.example:iscsitgt01-0001.
22690       Created TPG 1.
22700
22710   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1 set attribute default_cmdsn_depth = 128
22720       Parameter default_cmdsn_depth is now '128'.
22730
22740   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1 set parameter MaxConnections = 1
22750       Parameter MaxConnections is now '1'.
22760
22770   a   sudo targetcli /iscsi create iqn.2016-09.com.example:iscsitgt01-0002
22780       Created target iqn.2016-09.com.example:iscsitgt01-0002.
22790       Created TPG 1.
22800
22810   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1 set attribute default_cmdsn_depth = 128
22820       Parameter default_cmdsn_depth is now '128'.
22830
22840   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1 set parameter MaxConnections = 1
22850       Parameter MaxConnections is now '1'.
22860
22870   a   sudo targetcli /iscsi create iqn.2016-09.com.example:iscsitgt01-0003
22880       Created target iqn.2016-09.com.example:iscsitgt01-0003.
22890       Created TPG 1.
22900
22910   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1 set attribute default_cmdsn_depth = 128
22920       Parameter default_cmdsn_depth is now '128'.
22930
22940   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1 set parameter MaxConnections = 1
22950       Parameter MaxConnections is now '1'.
22960
22970   a   sudo targetcli ls /
```

```
o- / ......................................................................... [...]
  o- backstores .............................................................. [...]
  | o- block .................................................. [Storage Objects: 0]
  | o- fileio ................................................. [Storage Objects: 0]
  | o- pscsi .................................................. [Storage Objects: 0]
  | o- ramdisk ................................................ [Storage Objects: 0]
  o- iscsi ............................................................ [Targets: 4]
  | o- iqn.2016-09.com.example:iscsitgt01-0000 ....................... [TPGs: 1]
  | | o- tpg1 ........................................... [no-gen-acls, no-auth]
  | |   o- acls ......................................................... [ACLs: 0]
  | |   o- luns ......................................................... [LUNs: 0]
  | |   o- portals ................................................... [Portals: 0]
  | o- iqn.2016-09.com.example:iscsitgt01-0001 ....................... [TPGs: 1]
  | | o- tpg1 ........................................... [no-gen-acls, no-auth]
  | |   o- acls ......................................................... [ACLs: 0]
  | |   o- luns ......................................................... [LUNs: 0]
  | |   o- portals ................................................... [Portals: 0]
  | o- iqn.2016-09.com.example:iscsitgt01-0002 ....................... [TPGs: 1]
  | | o- tpg1 ........................................... [no-gen-acls, no-auth]
  | |   o- acls ......................................................... [ACLs: 0]
  | |   o- luns ......................................................... [LUNs: 0]
  | |   o- portals ................................................... [Portals: 0]
  | o- iqn.2016-09.com.example:iscsitgt01-0003 ....................... [TPGs: 1]
  |   o- tpg1 ........................................... [no-gen-acls, no-auth]
  |     o- acls ......................................................... [ACLs: 0]
  |     o- luns ......................................................... [LUNs: 0]
  |     o- portals ................................................... [Portals: 0]
  o- loopback ........................................................... [Targets: 0]
```

○ Active 機で、ACL（アクセス許可リスト）にイニシエータ名を登録します。必要に応じて CHAP 認証情報も紐付けします。

```
a sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls create iqn.2016-09.com.example:initiator01
Created Node ACL for iqn.2016-09.com.example:initiator01

a  sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls/iqn.2016-09.com.example:initiator01 set auth userid=iscsiuser01
Parameter userid is now 'iscsiuser01'.

a  sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls/iqn.2016-09.com.example:initiator01 set auth password='password-user01'
Parameter password is now 'password-user01'.
```

```
23380   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls create iqn.2016-09.com.example:initiator01
23390       Created Node ACL for iqn.2016-09.com.example:initiator01
23400
23410   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls/iqn.2016-09.com.example:initiator01 set auth userid=iscsiuser01
23420       Parameter userid is now 'iscsiuser01'.
23430
23440   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls/iqn.2016-09.com.example:initiator01 set auth password='password-user01'
23450       Parameter password is now 'password-user01'.
23460
23470   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls create iqn.2016-09.com.example:initiator01
23480       Created Node ACL for iqn.2016-09.com.example:initiator01
23490
23500   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls/iqn.2016-09.com.example:initiator01 set auth userid=iscsiuser01
23510       Parameter userid is now 'iscsiuser01'.
23520
23530   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls/iqn.2016-09.com.example:initiator01 set auth password='password-user01'
23540       Parameter password is now 'password-user01'.
23550
23560   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls create iqn.2016-09.com.example:initiator01
23570       Created Node ACL for iqn.2016-09.com.example:initiator01
23580
23590   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls/iqn.2016-09.com.example:initiator01 set auth userid=iscsiuser01
23600       Parameter userid is now 'iscsiuser01'.
23610
23620   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls/iqn.2016-09.com.example:initiator01 set auth password='password-user01'
23630       Parameter password is now 'password-user01'.
23640
23650
23660   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls create iqn.2016-09.com.example:initiator02
23670       Created Node ACL for iqn.2016-09.com.example:initiator02
23680
23690   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls/iqn.2016-09.com.example:initiator02 set auth userid=iscsiuser02
23700       Parameter userid is now 'iscsiuser02'.
23710
23720   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls/iqn.2016-09.com.example:initiator02 set auth password='password-user02'
23730       Parameter password is now 'password-user02'.
23740
23750   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls create iqn.2016-09.com.example:initiator02
23760       Created Node ACL for iqn.2016-09.com.example:initiator02
23770
```

```
23780   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls/iqn.2016-09.com.example:initiator02 set auth userid=iscsiuser02
23790     Parameter userid is now 'iscsiuser02'.
23800
23810   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls/iqn.2016-09.com.example:initiator02 set auth password='password-user02'
23820     Parameter password is now 'password-user02'.
23830
23840   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls create iqn.2016-09.com.example:initiator02
23850     Created Node ACL for iqn.2016-09.com.example:initiator02
23860
23870   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls/iqn.2016-09.com.example:initiator02 set auth userid=iscsiuser02
23880     Parameter userid is now 'iscsiuser02'.
23890
23900   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls/iqn.2016-09.com.example:initiator02 set auth password='password-user02'
23910     Parameter password is now 'password-user02'.
23920
23930   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls create iqn.2016-09.com.example:initiator02
23940     Created Node ACL for iqn.2016-09.com.example:initiator02
23950
23960   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls/iqn.2016-09.com.example:initiator02 set auth userid=iscsiuser02
23970     Parameter userid is now 'iscsiuser02'.
23980
23990   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls/iqn.2016-09.com.example:initiator02 set auth password='password-user02'
24000     Parameter password is now 'password-user02'.
24010
24020
24030   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls create iqn.2016-09.com.example:initiator03
24040     Created Node ACL for iqn.2016-09.com.example:initiator03
24050
24060   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls/iqn.2016-09.com.example:initiator03 set auth userid=iscsiuser03
24070     Parameter userid is now 'iscsiuser03'.
24080
24090   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls/iqn.2016-09.com.example:initiator03 set auth password='password-user03'
24100     Parameter password is now 'password-user03'.
24110
24120   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls create iqn.2016-09.com.example:initiator03
24130     Created Node ACL for iqn.2016-09.com.example:initiator03
24140
24150   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls/iqn.2016-09.com.example:initiator03 set auth userid=iscsiuser03
24160     Parameter userid is now 'iscsiuser03'.
24170
```

```
24180   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls/iqn.2016-09.com.example:initiator03 set auth password='password-user03'
24190   Parameter password is now 'password-user03'.
24200
24210   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls create iqn.2016-09.com.example:initiator03
24220   Created Node ACL for iqn.2016-09.com.example:initiator03
24230
24240   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls/iqn.2016-09.com.example:initiator03 set auth userid=iscsiuser03
24250   Parameter userid is now 'iscsiuser03'.
24260
24270   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls/iqn.2016-09.com.example:initiator03 set auth password='password-user03'
24280   Parameter password is now 'password-user03'.
24290
24300   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls create iqn.2016-09.com.example:initiator03
24310   Created Node ACL for iqn.2016-09.com.example:initiator03
24320
24330   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls/iqn.2016-09.com.example:initiator03 set auth userid=iscsiuser03
24340   Parameter userid is now 'iscsiuser03'.
24350
24360   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls/iqn.2016-09.com.example:initiator03 set auth password='password-user03'
24370   Parameter password is now 'password-user03'.
24380
24390
24400   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls create iqn.2016-09.com.example:initiator04
24410   Created Node ACL for iqn.2016-09.com.example:initiator04
24420
24430   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls/iqn.2016-09.com.example:initiator04 set auth userid=iscsiuser04
24440   Parameter userid is now 'iscsiuser04'.
24450
24460   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/acls/iqn.2016-09.com.example:initiator04 set auth password='password-user04'
24470   Parameter password is now 'password-user04'.
24480
24490   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls create iqn.2016-09.com.example:initiator04
24500   Created Node ACL for iqn.2016-09.com.example:initiator04
24510
24520   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls/iqn.2016-09.com.example:initiator04 set auth userid=iscsiuser04
24530   Parameter userid is now 'iscsiuser04'.
24540
24550   a     sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/acls/iqn.2016-09.com.example:initiator04 set auth password='password-user04'
24560   Parameter password is now 'password-user04'.
24570
```

```
24580  a  sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls create iqn.2016-09.com.example:initiator04
24590     Created Node ACL for iqn.2016-09.com.example:initiator04
24600
24610  a    sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls/iqn.2016-09.com.example:initiator04 set auth userid=iscsiuser04
24620     Parameter userid is now 'iscsiuser04'.
24630
24640  a    sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/acls/iqn.2016-09.com.example:initiator04 set auth password='password-user04'
24650     Parameter password is now 'password-user04'.
24660
24670  a  sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls create iqn.2016-09.com.example:initiator04
24680     Created Node ACL for iqn.2016-09.com.example:initiator04
24690
24700  a    sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls/iqn.2016-09.com.example:initiator04 set auth userid=iscsiuser04
24710     Parameter userid is now 'iscsiuser04'.
24720
24730  a    sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/acls/iqn.2016-09.com.example:initiator04 set auth password='password-user04'
24740     Parameter password is now 'password-user04'.
24750
24760  a  sudo targetcli ls /
24770     o- / ..................................................................... [...]
24780       o- backstores ......................................................... [...]
24790       | o- block ............................................ [Storage Objects: 0]
24800       | o- fileio ........................................... [Storage Objects: 0]
24810       | o- pscsi ............................................ [Storage Objects: 0]
24820       | o- ramdisk .......................................... [Storage Objects: 0]
24830       o- iscsi ....................................................... [Targets: 4]
24840       | o- iqn.2016-09.com.example:iscsitgt01-0000 ....................... [TPGs: 1]
24850       | | o- tpg1 ........................................ [no-gen-acls, no-auth]
24860       | |   o- acls ..................................................... [ACLs: 4]
24870       | |   | o- iqn.2016-09.com.example:initiator01 .............. [Mapped LUNs: 0]
24880       | |   | o- iqn.2016-09.com.example:initiator02 .............. [Mapped LUNs: 0]
24890       | |   | o- iqn.2016-09.com.example:initiator03 .............. [Mapped LUNs: 0]
24900       | |   | o- iqn.2016-09.com.example:initiator04 .............. [Mapped LUNs: 0]
24910       | |   o- luns ..................................................... [LUNs: 0]
24920       | |   o- portals ............................................... [Portals: 0]
24930       | o- iqn.2016-09.com.example:iscsitgt01-0001 ....................... [TPGs: 1]
24940       | | o- tpg1 ........................................ [no-gen-acls, no-auth]
24950       | |   o- acls ..................................................... [ACLs: 4]
24960       | |   | o- iqn.2016-09.com.example:initiator01 .............. [Mapped LUNs: 0]
24970       | |   | o- iqn.2016-09.com.example:initiator02 .............. [Mapped LUNs: 0]
```

```
      | |   | o- iqn.2016-09.com.example:initiator03 ..... [Mapped LUNs: 0]
      | |   | o- iqn.2016-09.com.example:initiator04 ..... [Mapped LUNs: 0]
      | |   o- luns ..................................................... [LUNs: 0]
      | |   o- portals ................................................. [Portals: 0]
      | o- iqn.2016-09.com.example:iscsitgt01-0002 ..................... [TPGs: 1]
      | | o- tpg1 ..................................... [no-gen-acls, no-auth]
      | |   o- acls ..................................................... [ACLs: 4]
      | |   | o- iqn.2016-09.com.example:initiator01 ..... [Mapped LUNs: 0]
      | |   | o- iqn.2016-09.com.example:initiator02 ..... [Mapped LUNs: 0]
      | |   | o- iqn.2016-09.com.example:initiator03 ..... [Mapped LUNs: 0]
      | |   | o- iqn.2016-09.com.example:initiator04 ..... [Mapped LUNs: 0]
      | |   o- luns ..................................................... [LUNs: 0]
      | |   o- portals ................................................. [Portals: 0]
      | o- iqn.2016-09.com.example:iscsitgt01-0003 ..................... [TPGs: 1]
      |   o- tpg1 ..................................... [no-gen-acls, no-auth]
      |     o- acls ..................................................... [ACLs: 4]
      |     | o- iqn.2016-09.com.example:initiator01 ..... [Mapped LUNs: 0]
      |     | o- iqn.2016-09.com.example:initiator02 ..... [Mapped LUNs: 0]
      |     | o- iqn.2016-09.com.example:initiator03 ..... [Mapped LUNs: 0]
      |     | o- iqn.2016-09.com.example:initiator04 ..... [Mapped LUNs: 0]
      |     o- luns ..................................................... [LUNs: 0]
      |     o- portals ................................................. [Portals: 0]
      o- loopback ....................................................... [Targets: 0]
```

○ Active 機で、バックエンド・デバイスを指定し、IQN に紐付けます。

a
```
sudo targetcli /backstores/block create name=lun0000 dev=/dev/vg1/lv-lun0000
Created block storage object lun0000 using /dev/vg1/lv-lun0000.
```

a
```
sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/luns create /backstores/block/lun0000
Created LUN 0.
Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator04
Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator03
Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator02
Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator01
```

a
```
sudo targetcli /backstores/block create name=lun0001 dev=/dev/vg1/lv-lun0001
Created block storage object lun0001 using /dev/vg1/lv-lun0001.
```

```
a  sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/luns create /backstores/block/lun0001
   Created LUN 0.
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator04
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator03
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator02
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator01


a  sudo targetcli /backstores/block create name=lun0002 dev=/dev/vg1/lv-lun0002
   Created block storage object lun0002 using /dev/vg1/lv-lun0002.

a  sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/luns create /backstores/block/lun0002
   Created LUN 0.
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator04
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator03
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator02
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator01


a  sudo targetcli /backstores/block create name=lun0003 dev=/dev/vg1/lv-lun0003
   Created block storage object lun0003 using /dev/vg1/lv-lun0003.

a  sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/luns create /backstores/block/lun0003
   Created LUN 0.
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator04
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator03
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator02
   Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator01

a  sudo targetcli ls /
   o- / ......................................................................... [...]
     o- backstores .............................................................. [...]
     | o- block .................................................. [Storage Objects: 4]
     | | o- lun0000 ......... [/dev/vg1/lv-lun0000 (324.0GiB) write-thru activated]
     | | o- lun0001 ........... [/dev/vg1/lv-lun0001 (7.2GiB) write-thru activated]
     | | o- lun0002 ........... [/dev/vg1/lv-lun0002 (7.2GiB) write-thru activated]
     | | o- lun0003 ........... [/dev/vg1/lv-lun0003 (7.2GiB) write-thru activated]
     | o- fileio ................................................. [Storage Objects: 0]
     | o- pscsi .................................................. [Storage Objects: 0]
     | o- ramdisk ................................................ [Storage Objects: 0]
```

```
25780         o- iscsi ..................................................... [Targets: 4]
25790         | o- iqn.2016-09.com.example:iscsitgt01-0000 ..................... [TPGs: 1]
25800         | | o- tpg1 ....................................... [no-gen-acls, no-auth]
25810         | |   o- acls ..................................................... [ACLs: 4]
25820         | |   | o- iqn.2016-09.com.example:initiator01 ..... [Mapped LUNs: 1]
25830         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0000 (rw)]
25840         | |   | o- iqn.2016-09.com.example:initiator02 ..... [Mapped LUNs: 1]
25850         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0000 (rw)]
25860         | |   | o- iqn.2016-09.com.example:initiator03 ..... [Mapped LUNs: 1]
25870         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0000 (rw)]
25880         | |   | o- iqn.2016-09.com.example:initiator04 ..... [Mapped LUNs: 1]
25890         | |   |   o- mapped_lun0 ......................... [lun0 block/lun0000 (rw)]
25900         | |   o- luns ..................................................... [LUNs: 4]
25910         | |   | o- lun0 ....................... [block/lun0000 (/dev/vg1/lv-lun0000)]
25920         | o- iqn.2016-09.com.example:iscsitgt01-0001 ..................... [TPGs: 1]
25930         | | o- tpg1 ....................................... [no-gen-acls, no-auth]
25940         | |   o- acls ..................................................... [ACLs: 4]
25950         | |   | o- iqn.2016-09.com.example:initiator01 ..... [Mapped LUNs: 1]
25960         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0001 (rw)]
25970         | |   | o- iqn.2016-09.com.example:initiator02 ..... [Mapped LUNs: 1]
25980         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0001 (rw)]
25990         | |   | o- iqn.2016-09.com.example:initiator03 ..... [Mapped LUNs: 1]
26000         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0001 (rw)]
26010         | |   | o- iqn.2016-09.com.example:initiator04 ..... [Mapped LUNs: 1]
26020         | |   |   o- mapped_lun0 ......................... [lun0 block/lun0001 (rw)]
26030         | |   o- luns ..................................................... [LUNs: 1]
26040         | |   | o- lun0 ....................... [block/lun0001 (/dev/vg1/lv-lun0001)]
26050         | o- iqn.2016-09.com.example:iscsitgt01-0002 ..................... [TPGs: 1]
26060         | | o- tpg1 ....................................... [no-gen-acls, no-auth]
26070         | |   o- acls ..................................................... [ACLs: 4]
26080         | |   | o- iqn.2016-09.com.example:initiator01 ..... [Mapped LUNs: 1]
26090         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0002 (rw)]
26100         | |   | o- iqn.2016-09.com.example:initiator02 ..... [Mapped LUNs: 1]
26110         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0002 (rw)]
26120         | |   | o- iqn.2016-09.com.example:initiator03 ..... [Mapped LUNs: 1]
26130         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0002 (rw)]
26140         | |   | o- iqn.2016-09.com.example:initiator04 ..... [Mapped LUNs: 1]
26150         | |   |   o- mapped_lun0 ......................... [lun0 block/lun0002 (rw)]
26160         | |   o- luns ..................................................... [LUNs: 1]
26170         | |   | o- lun0 ....................... [block/lun0002 (/dev/vg1/lv-lun0002)]
```

```
  | o- iqn.2016-09.com.example:iscsitgt01-0003 ..................... [TPGs: 1]
  |   o- tpg1 ....................................... [no-gen-acls, no-auth]
  |     o- acls ..................................................... [ACLs: 4]
  |     | o- iqn.2016-09.com.example:initiator01 ............. [Mapped LUNs: 1]
  |     | | o- mapped_lun0 ........................... [lun0 block/lun0003 (rw)]
  |     | o- iqn.2016-09.com.example:initiator02 ............. [Mapped LUNs: 1]
  |     | | o- mapped_lun0 ........................... [lun0 block/lun0003 (rw)]
  |     | o- iqn.2016-09.com.example:initiator03 ............. [Mapped LUNs: 1]
  |     | | o- mapped_lun0 ........................... [lun0 block/lun0003 (rw)]
  |     | o- iqn.2016-09.com.example:initiator04 ............. [Mapped LUNs: 1]
  |     |   o- mapped_lun0 ........................... [lun0 block/lun0003 (rw)]
  |     o- luns ..................................................... [LUNs: 1]
  |     | o- lun0 ....................... [block/lun0003 (/dev/vg1/lv-lun0003)]
  |     o- portals ............................................... [Portals: 0]
  o- loopback ..................................................... [Targets: 0]
```

○ Active 機で、IQN に portal を作成します。

```
a sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0000/tpg1/portals create 10.110.88.59 3260
  Using default IP port 3260
  Created network portal 10.110.88.59:3260.

a sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0001/tpg1/portals create 10.110.88.59 3260
  Using default IP port 3260
  Created network portal 10.110.88.59:3260.

a sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0002/tpg1/portals create 10.110.88.59 3260
  Using default IP port 3260
  Created network portal 10.110.88.59:3260.

a sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01-0003/tpg1/portals create 10.110.88.59 3260
  Using default IP port 3260
  Created network portal 10.110.88.59:3260.

a sudo targetcli ls /
  o- / ..................................................................... [...]
    o- backstores ......................................................... [...]
    | o- block ............................................ [Storage Objects: 4]
    | | o- lun0000 ......... [/dev/vg1/lv-lun0000 (324.0GiB) write-thru activated]
    | | o- lun0001 ........... [/dev/vg1/lv-lun0001 (7.2GiB) write-thru activated]
```

```
26580         | | o- lun0002 ........... [/dev/vg1/lv-lun0002 (7.2GiB) write-thru activated]
26590         | | o- lun0003 ........... [/dev/vg1/lv-lun0003 (7.2GiB) write-thru activated]
26600         | o- fileio ............................................ [Storage Objects: 0]
26610         | o- pscsi ............................................. [Storage Objects: 0]
26620         | o- ramdisk ........................................... [Storage Objects: 0]
26630         o- iscsi ........................................................ [Targets: 4]
26640         | o- iqn.2016-09.com.example:iscsitgt01-0000 ....................... [TPGs: 1]
26650         |   o- tpg1 ........................................... [no-gen-acls, no-auth]
26660         |     o- acls ...................................................... [ACLs: 4]
26670         |     | o- iqn.2016-09.com.example:initiator01 .............. [Mapped LUNs: 4]
26680         | |   | | o- mapped_lun0 ........................... [lun0 block/lun0000 (rw)]
26690         | |   | o- iqn.2016-09.com.example:initiator02 .............. [Mapped LUNs: 1]
26700         | |   | | o- mapped_lun0 ........................... [lun0 block/lun0000 (rw)]
26710         | |   | o- iqn.2016-09.com.example:initiator03 .............. [Mapped LUNs: 1]
26720         | |   | | o- mapped_lun0 ........................... [lun0 block/lun0000 (rw)]
26730         | |   | o- iqn.2016-09.com.example:initiator04 .............. [Mapped LUNs: 1]
26740         | |   |   o- mapped_lun0 ........................... [lun0 block/lun0000 (rw)]
26750         | |   o- luns ........................................................ [LUNs: 1]
26760         | |   | o- lun0 ....................... [block/lun0000 (/dev/vg1/lv-lun0000)]
26770         | |   o- portals ..................................................... [Portals: 1]
26780         | |     o- 10.110.88.59:3260 ..................................................... [OK]
26790         | o- iqn.2016-09.com.example:iscsitgt01-0001 ....................... [TPGs: 1]
26800         | | o- tpg1 ........................................... [no-gen-acls, no-auth]
26810         | |   o- acls ...................................................... [ACLs: 4]
26820         | |   | o- iqn.2016-09.com.example:initiator01 .............. [Mapped LUNs: 1]
26830         | |   | | o- mapped_lun0 ........................... [lun0 block/lun0001 (rw)]
26840         | |   | o- iqn.2016-09.com.example:initiator02 .............. [Mapped LUNs: 1]
26850         | |   | | o- mapped_lun0 ........................... [lun0 block/lun0001 (rw)]
26860         | |   | o- iqn.2016-09.com.example:initiator03 .............. [Mapped LUNs: 1]
26870         | |   | | o- mapped_lun0 ........................... [lun0 block/lun0001 (rw)]
26880         | |   | o- iqn.2016-09.com.example:initiator04 .............. [Mapped LUNs: 1]
26890         | |   |   o- mapped_lun0 ........................... [lun0 block/lun0001 (rw)]
26900         | |   o- luns ........................................................ [LUNs: 1]
26910         | |   | o- lun0 ....................... [block/lun0001 (/dev/vg1/lv-lun0001)]
26920         | |   o- portals ..................................................... [Portals: 1]
26930         | |     o- 10.110.88.59:3260 ..................................................... [OK]
26940         | o- iqn.2016-09.com.example:iscsitgt01-0002 ....................... [TPGs: 1]
26950         | | o- tpg1 ........................................... [no-gen-acls, no-auth]
26960         | |   o- acls ...................................................... [ACLs: 4]
26970         | |   | o- iqn.2016-09.com.example:initiator01 .............. [Mapped LUNs: 1]
```

```
26980         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0002 (rw)]
26990         | |   | o- iqn.2016-09.com.example:initiator02 ..... [Mapped LUNs: 1]
27000         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0002 (rw)]
27010         | |   | o- iqn.2016-09.com.example:initiator03 ..... [Mapped LUNs: 1]
27020         | |   | | o- mapped_lun0 ......................... [lun0 block/lun0002 (rw)]
27030         | |   | o- iqn.2016-09.com.example:initiator04 ..... [Mapped LUNs: 1]
27040         | |   |   o- mapped_lun0 ......................... [lun0 block/lun0002 (rw)]
27050         | |   o- luns ................................................... [LUNs: 1]
27060         | |   | o- lun0 ....................... [block/lun0002 (/dev/vg1/lv-lun0002)]
27070         | |   o- portals ............................................... [Portals: 1]
27080         | |     o- 10.110.88.59:3260 ................................... [OK]
27090         | o- iqn.2016-09.com.example:iscsitgt01-0003 ..................... [TPGs: 1]
27100         |   o- tpg1 ....................................... [no-gen-acls, no-auth]
27110         |     o- acls ................................................. [ACLs: 4]
27120         |     | o- iqn.2016-09.com.example:initiator01 ..... [Mapped LUNs: 1]
27130         |     | | o- mapped_lun0 ......................... [lun0 block/lun0003 (rw)]
27140         |     | o- iqn.2016-09.com.example:initiator02 ..... [Mapped LUNs: 1]
27150         |     | | o- mapped_lun0 ......................... [lun0 block/lun0003 (rw)]
27160         |     | o- iqn.2016-09.com.example:initiator03 ..... [Mapped LUNs: 1]
27170         |     | | o- mapped_lun0 ......................... [lun0 block/lun0003 (rw)]
27180         |     | o- iqn.2016-09.com.example:initiator04 ..... [Mapped LUNs: 1]
27190         |     |   o- mapped_lun0 ......................... [lun0 block/lun0003 (rw)]
27200         |     o- luns ................................................. [LUNs: 1]
27210         |     | o- lun0 ....................... [block/lun0003 (/dev/vg1/lv-lun0003)]
27220         |     o- portals ............................................. [Portals: 1]
27230         |       o- 10.110.88.59:3260 ................................. [OK]
27240         o- loopback ................................................... [Targets: 0]
27250
27260   a   ss -ant | grep LISTEN.¥*3260
27270       LISTEN     0      256    10.110.88.59:3260                  *:*
27280
27290   ○   Active 機で、設定ファイルに設定を保存し、Stand-by 機にコピーします。
27300
27310   a   sudo targetcli saveconfig
27320       Last 10 configs saved in /etc/target/backup.
27330       Configuration saved to /etc/target/saveconfig.json
27340
27350   a   sudo scp -p /etc/target/saveconfig.json iscsitgt01s:/etc/target/saveconfig.json
27360       saveconfig.json                               100%   11KB  11.0KB/s   00:00
27370
```

○ Active 機で、設定ファイルを確認します。

a
```
sudo cat /etc/target/saveconfig.json
{
  "fabric_modules": [],
  "storage_objects": [
    {
      "attributes": {
        "block_size": 512,
        "emulate_3pc": 1,
        "emulate_caw": 1,
        "emulate_dpo": 0,
        "emulate_fua_read": 0,
        "emulate_fua_write": 1,
        "emulate_model_alias": 1,
        "emulate_rest_reord": 0,
        "emulate_tas": 1,
        "emulate_tpu": 0,
        "emulate_tpws": 0,
        "emulate_ua_intlck_ctrl": 0,
        "emulate_write_cache": 0,
        "enforce_pr_isids": 1,
        "force_pr_aptpl": 0,
        "is_nonrot": 0,
        "max_unmap_block_desc_count": 1,
        "max_unmap_lba_count": 8192,
        "max_write_same_len": 65535,
        "optimal_sectors": 2048,
        "pi_prot_format": 0,
        "pi_prot_type": 0,
        "queue_depth": 128,
        "unmap_granularity": 2048,
        "unmap_granularity_alignment": 0
      },
      "dev": "/dev/vg1/lv-lun0003",
      "name": "lun0003",
      "plugin": "block",
      "readonly": false,
      "write_back": false,
      "wwn": "03880f22-4ca1-48e8-b6e5-cf303af79ade"
```

```
        },
        {
          "attributes": {
            "block_size": 512,
            "emulate_3pc": 1,
            "emulate_caw": 1,
            "emulate_dpo": 0,
            "emulate_fua_read": 0,
            "emulate_fua_write": 1,
            "emulate_model_alias": 1,
            "emulate_rest_reord": 0,
            "emulate_tas": 1,
            "emulate_tpu": 0,
            "emulate_tpws": 0,
            "emulate_ua_intlck_ctrl": 0,
            "emulate_write_cache": 0,
            "enforce_pr_isids": 1,
            "force_pr_aptpl": 0,
            "is_nonrot": 0,
            "max_unmap_block_desc_count": 1,
            "max_unmap_lba_count": 8192,
            "max_write_same_len": 65535,
            "optimal_sectors": 2048,
            "pi_prot_format": 0,
            "pi_prot_type": 0,
            "queue_depth": 128,
            "unmap_granularity": 2048,
            "unmap_granularity_alignment": 0
          },
          "dev": "/dev/vg1/lv-lun0002",
          "name": "lun0002",
          "plugin": "block",
          "readonly": false,
          "write_back": false,
          "wwn": "9c5e3ced-aea8-46d5-89a8-c5944a1d4cd3"
        },
        {
          "attributes": {
            "block_size": 512,
            "emulate_3pc": 1,
```

```
28180             "emulate_caw": 1,
28190             "emulate_dpo": 0,
28200             "emulate_fua_read": 0,
28210             "emulate_fua_write": 1,
28220             "emulate_model_alias": 1,
28230             "emulate_rest_reord": 0,
28240             "emulate_tas": 1,
28250             "emulate_tpu": 0,
28260             "emulate_tpws": 0,
28270             "emulate_ua_intlck_ctrl": 0,
28280             "emulate_write_cache": 0,
28290             "enforce_pr_isids": 1,
28300             "force_pr_aptpl": 0,
28310             "is_nonrot": 0,
28320             "max_unmap_block_desc_count": 1,
28330             "max_unmap_lba_count": 8192,
28340             "max_write_same_len": 65535,
28350             "optimal_sectors": 2048,
28360             "pi_prot_format": 0,
28370             "pi_prot_type": 0,
28380             "queue_depth": 128,
28390             "unmap_granularity": 2048,
28400             "unmap_granularity_alignment": 0
28410           },
28420           "dev": "/dev/vg1/lv-lun0001",
28430           "name": "lun0001",
28440           "plugin": "block",
28450           "readonly": false,
28460           "write_back": false,
28470           "wwn": "5a7d4ce5-206e-40f2-a22f-b143637136ab"
28480         },
28490         {
28500           "attributes": {
28510             "block_size": 512,
28520             "emulate_3pc": 1,
28530             "emulate_caw": 1,
28540             "emulate_dpo": 0,
28550             "emulate_fua_read": 0,
28560             "emulate_fua_write": 1,
28570             "emulate_model_alias": 1,
```

```
28580             "emulate_rest_reord": 0,
28590             "emulate_tas": 1,
28600             "emulate_tpu": 0,
28610             "emulate_tpws": 0,
28620             "emulate_ua_intlck_ctrl": 0,
28630             "emulate_write_cache": 0,
28640             "enforce_pr_isids": 1,
28650             "force_pr_aptpl": 0,
28660             "is_nonrot": 0,
28670             "max_unmap_block_desc_count": 1,
28680             "max_unmap_lba_count": 8192,
28690             "max_write_same_len": 65535,
28700             "optimal_sectors": 2048,
28710             "pi_prot_format": 0,
28720             "pi_prot_type": 0,
28730             "queue_depth": 128,
28740             "unmap_granularity": 2048,
28750             "unmap_granularity_alignment": 0
28760           },
28770           "dev": "/dev/vg1/lv-lun0000",
28780           "name": "lun0000",
28790           "plugin": "block",
28800           "readonly": false,
28810           "write_back": false,
28820           "wwn": "117473ae-68c7-44cd-b665-f7ad42bf1bd0"
28830         }
28840       ],
28850       "targets": [
28860         {
28870           "fabric": "iscsi",
28880           "tpgs": [
28890             {
28900               "attributes": {
28910                 "authentication": 0,
28920                 "cache_dynamic_acls": 0,
28930                 "default_cmdsn_depth": 128,
28940                 "default_erl": 0,
28950                 "demo_mode_discovery": 1,
28960                 "demo_mode_write_protect": 1,
28970                 "fabric_prot_type": 0,
```

```
      "generate_node_acls": 0,
      "login_timeout": 15,
      "netif_timeout": 2,
      "prod_mode_write_protect": 0,
      "t10_pi": 0
    },
    "enable": true,
    "luns": [
      {
        "index": 0,
        "storage_object": "/backstores/block/lun0003"
      }
    ],
    "node_acls": [
      {
        "attributes": {
          "dataout_timeout": 3,
          "dataout_timeout_retries": 5,
          "default_erl": 0,
          "nopin_response_timeout": 30,
          "nopin_timeout": 15,
          "random_datain_pdu_offsets": 0,
          "random_datain_seq_offsets": 0,
          "random_r2t_offsets": 0
        },
        "chap_password": "password-user04",
        "chap_userid": "iscsiuser04",
        "mapped_luns": [
          {
            "index": 0,
            "tpg_lun": 0,
            "write_protect": false
          }
        ],
        "node_wwn": "iqn.2016-09.com.example:initiator04"
      },
      {
        "attributes": {
          "dataout_timeout": 3,
          "dataout_timeout_retries": 5,
```

```
29380                     "default_erl": 0,
29390                     "nopin_response_timeout": 30,
29400                     "nopin_timeout": 15,
29410                     "random_datain_pdu_offsets": 0,
29420                     "random_datain_seq_offsets": 0,
29430                     "random_r2t_offsets": 0
29440                   },
29450                   "chap_password": "password-user03",
29460                   "chap_userid": "iscsiuser03",
29470                   "mapped_luns": [
29480                     {
29490                       "index": 0,
29500                       "tpg_lun": 0,
29510                       "write_protect": false
29520                     }
29530                   ],
29540                   "node_wwn": "iqn.2016-09.com.example:initiator03"
29550                 },
29560                 {
29570                   "attributes": {
29580                     "dataout_timeout": 3,
29590                     "dataout_timeout_retries": 5,
29600                     "default_erl": 0,
29610                     "nopin_response_timeout": 30,
29620                     "nopin_timeout": 15,
29630                     "random_datain_pdu_offsets": 0,
29640                     "random_datain_seq_offsets": 0,
29650                     "random_r2t_offsets": 0
29660                   },
29670                   "chap_password": "password-user02",
29680                   "chap_userid": "iscsiuser02",
29690                   "mapped_luns": [
29700                     {
29710                       "index": 0,
29720                       "tpg_lun": 0,
29730                       "write_protect": false
29740                     }
29750                   ],
29760                   "node_wwn": "iqn.2016-09.com.example:initiator02"
29770                 },
```

```
                {
                  "attributes": {
                    "dataout_timeout": 3,
                    "dataout_timeout_retries": 5,
                    "default_erl": 0,
                    "nopin_response_timeout": 30,
                    "nopin_timeout": 15,
                    "random_datain_pdu_offsets": 0,
                    "random_datain_seq_offsets": 0,
                    "random_r2t_offsets": 0
                  },
                  "chap_password": "password-user01",
                  "chap_userid": "iscsiuser01",
                  "mapped_luns": [
                    {
                      "index": 0,
                      "tpg_lun": 0,
                      "write_protect": false
                    }
                  ],
                  "node_wwn": "iqn.2016-09.com.example:initiator01"
                }
              ],
              "parameters": {
                "AuthMethod": "CHAP,None",
                "DataDigest": "CRC32C,None",
                "DataPDUInOrder": "Yes",
                "DataSequenceInOrder": "Yes",
                "DefaultTime2Retain": "20",
                "DefaultTime2Wait": "2",
                "ErrorRecoveryLevel": "0",
                "FirstBurstLength": "65536",
                "HeaderDigest": "CRC32C,None",
                "IFMarkInt": "2048~65535",
                "IFMarker": "No",
                "ImmediateData": "Yes",
                "InitialR2T": "Yes",
                "MaxBurstLength": "262144",
                "MaxConnections": "1",
                "MaxOutstandingR2T": "1",
```

```
                "MaxRecvDataSegmentLength": "8192",
                "MaxXmitDataSegmentLength": "262144",
                "OFMarkInt": "2048~65535",
                "OFMarker": "No",
                "TargetAlias": "LIO Target"
              },
              "portals": [
                {
                  "ip_address": "10.110.88.59",
                  "iser": false,
                  "port": 3260
                }
              ],
              "tag": 1
            }
          ],
          "wwn": "iqn.2016-09.com.example:iscsitgt01-0003"
        },
        {
          "fabric": "iscsi",
          "tpgs": [
            {
              "attributes": {
                "authentication": 0,
                "cache_dynamic_acls": 0,
                "default_cmdsn_depth": 128,
                "default_erl": 0,
                "demo_mode_discovery": 1,
                "demo_mode_write_protect": 1,
                "fabric_prot_type": 0,
                "generate_node_acls": 0,
                "login_timeout": 15,
                "netif_timeout": 2,
                "prod_mode_write_protect": 0,
                "t10_pi": 0
              },
              "enable": true,
              "luns": [
                {
                  "index": 0,
```

```
30580                 "storage_object": "/backstores/block/lun0002"
30590               }
30600             ],
30610             "node_acls": [
30620               {
30630                 "attributes": {
30640                   "dataout_timeout": 3,
30650                   "dataout_timeout_retries": 5,
30660                   "default_erl": 0,
30670                   "nopin_response_timeout": 30,
30680                   "nopin_timeout": 15,
30690                   "random_datain_pdu_offsets": 0,
30700                   "random_datain_seq_offsets": 0,
30710                   "random_r2t_offsets": 0
30720                 },
30730                 "chap_password": "password-user04",
30740                 "chap_userid": "iscsiuser04",
30750                 "mapped_luns": [
30760                   {
30770                     "index": 0,
30780                     "tpg_lun": 0,
30790                     "write_protect": false
30800                   }
30810                 ],
30820                 "node_wwn": "iqn.2016-09.com.example:initiator04"
30830               },
30840               {
30850                 "attributes": {
30860                   "dataout_timeout": 3,
30870                   "dataout_timeout_retries": 5,
30880                   "default_erl": 0,
30890                   "nopin_response_timeout": 30,
30900                   "nopin_timeout": 15,
30910                   "random_datain_pdu_offsets": 0,
30920                   "random_datain_seq_offsets": 0,
30930                   "random_r2t_offsets": 0
30940                 },
30950                 "chap_password": "password-user03",
30960                 "chap_userid": "iscsiuser03",
30970                 "mapped_luns": [
```

```
30980                     {
30990                       "index": 0,
31000                       "tpg_lun": 0,
31010                       "write_protect": false
31020                     }
31030                   ],
31040                   "node_wwn": "iqn.2016-09.com.example:initiator03"
31050                 },
31060                 {
31070                   "attributes": {
31080                     "dataout_timeout": 3,
31090                     "dataout_timeout_retries": 5,
31100                     "default_erl": 0,
31110                     "nopin_response_timeout": 30,
31120                     "nopin_timeout": 15,
31130                     "random_datain_pdu_offsets": 0,
31140                     "random_datain_seq_offsets": 0,
31150                     "random_r2t_offsets": 0
31160                   },
31170                   "chap_password": "password-user02",
31180                   "chap_userid": "iscsiuser02",
31190                   "mapped_luns": [
31200                     {
31210                       "index": 0,
31220                       "tpg_lun": 0,
31230                       "write_protect": false
31240                     }
31250                   ],
31260                   "node_wwn": "iqn.2016-09.com.example:initiator02"
31270                 },
31280                 {
31290                   "attributes": {
31300                     "dataout_timeout": 3,
31310                     "dataout_timeout_retries": 5,
31320                     "default_erl": 0,
31330                     "nopin_response_timeout": 30,
31340                     "nopin_timeout": 15,
31350                     "random_datain_pdu_offsets": 0,
31360                     "random_datain_seq_offsets": 0,
31370                     "random_r2t_offsets": 0
```

```
      },
      "chap_password": "password-user01",
      "chap_userid": "iscsiuser01",
      "mapped_luns": [
        {
          "index": 0,
          "tpg_lun": 0,
          "write_protect": false
        }
      ],
      "node_wwn": "iqn.2016-09.com.example:initiator01"
    }
  ],
  "parameters": {
    "AuthMethod": "CHAP,None",
    "DataDigest": "CRC32C,None",
    "DataPDUInOrder": "Yes",
    "DataSequenceInOrder": "Yes",
    "DefaultTime2Retain": "20",
    "DefaultTime2Wait": "2",
    "ErrorRecoveryLevel": "0",
    "FirstBurstLength": "65536",
    "HeaderDigest": "CRC32C,None",
    "IFMarkInt": "2048~65535",
    "IFMarker": "No",
    "ImmediateData": "Yes",
    "InitialR2T": "Yes",
    "MaxBurstLength": "262144",
    "MaxConnections": "1",
    "MaxOutstandingR2T": "1",
    "MaxRecvDataSegmentLength": "8192",
    "MaxXmitDataSegmentLength": "262144",
    "OFMarkInt": "2048~65535",
    "OFMarker": "No",
    "TargetAlias": "LIO Target"
  },
  "portals": [
    {
      "ip_address": "10.110.88.59",
      "iser": false,
```

```
                    "port": 3260
                  }
                ],
                "tag": 1
              }
            ],
            "wwn": "iqn.2016-09.com.example:iscsitgt01-0002"
          },
          {
            "fabric": "iscsi",
            "tpgs": [
              {
                "attributes": {
                  "authentication": 0,
                  "cache_dynamic_acls": 0,
                  "default_cmdsn_depth": 128,
                  "default_erl": 0,
                  "demo_mode_discovery": 1,
                  "demo_mode_write_protect": 1,
                  "fabric_prot_type": 0,
                  "generate_node_acls": 0,
                  "login_timeout": 15,
                  "netif_timeout": 2,
                  "prod_mode_write_protect": 0,
                  "t10_pi": 0
                },
                "enable": true,
                "luns": [
                  {
                    "index": 0,
                    "storage_object": "/backstores/block/lun0001"
                  }
                ],
                "node_acls": [
                  {
                    "attributes": {
                      "dataout_timeout": 3,
                      "dataout_timeout_retries": 5,
                      "default_erl": 0,
                      "nopin_response_timeout": 30,
```

```
                "nopin_timeout": 15,
                "random_datain_pdu_offsets": 0,
                "random_datain_seq_offsets": 0,
                "random_r2t_offsets": 0
              },
              "chap_password": "password-user04",
              "chap_userid": "iscsiuser04",
              "mapped_luns": [
                {
                  "index": 0,
                  "tpg_lun": 0,
                  "write_protect": false
                }
              ],
              "node_wwn": "iqn.2016-09.com.example:initiator04"
            },
            {
              "attributes": {
                "dataout_timeout": 3,
                "dataout_timeout_retries": 5,
                "default_erl": 0,
                "nopin_response_timeout": 30,
                "nopin_timeout": 15,
                "random_datain_pdu_offsets": 0,
                "random_datain_seq_offsets": 0,
                "random_r2t_offsets": 0
              },
              "chap_password": "password-user03",
              "chap_userid": "iscsiuser03",
              "mapped_luns": [
                {
                  "index": 0,
                  "tpg_lun": 0,
                  "write_protect": false
                }
              ],
              "node_wwn": "iqn.2016-09.com.example:initiator03"
            },
            {
              "attributes": {
```

```
32580                   "dataout_timeout": 3,
32590                   "dataout_timeout_retries": 5,
32600                   "default_erl": 0,
32610                   "nopin_response_timeout": 30,
32620                   "nopin_timeout": 15,
32630                   "random_datain_pdu_offsets": 0,
32640                   "random_datain_seq_offsets": 0,
32650                   "random_r2t_offsets": 0
32660                 },
32670                 "chap_password": "password-user02",
32680                 "chap_userid": "iscsiuser02",
32690                 "mapped_luns": [
32700                   {
32710                     "index": 0,
32720                     "tpg_lun": 0,
32730                     "write_protect": false
32740                   }
32750                 ],
32760                 "node_wwn": "iqn.2016-09.com.example:initiator02"
32770               },
32780               {
32790                 "attributes": {
32800                   "dataout_timeout": 3,
32810                   "dataout_timeout_retries": 5,
32820                   "default_erl": 0,
32830                   "nopin_response_timeout": 30,
32840                   "nopin_timeout": 15,
32850                   "random_datain_pdu_offsets": 0,
32860                   "random_datain_seq_offsets": 0,
32870                   "random_r2t_offsets": 0
32880                 },
32890                 "chap_password": "password-user01",
32900                 "chap_userid": "iscsiuser01",
32910                 "mapped_luns": [
32920                   {
32930                     "index": 0,
32940                     "tpg_lun": 0,
32950                     "write_protect": false
32960                   }
32970                 ],
```

```
                "node_wwn": "iqn.2016-09.com.example:initiator01"
              }
            ],
            "parameters": {
              "AuthMethod": "CHAP,None",
              "DataDigest": "CRC32C,None",
              "DataPDUInOrder": "Yes",
              "DataSequenceInOrder": "Yes",
              "DefaultTime2Retain": "20",
              "DefaultTime2Wait": "2",
              "ErrorRecoveryLevel": "0",
              "FirstBurstLength": "65536",
              "HeaderDigest": "CRC32C,None",
              "IFMarkInt": "2048~65535",
              "IFMarker": "No",
              "ImmediateData": "Yes",
              "InitialR2T": "Yes",
              "MaxBurstLength": "262144",
              "MaxConnections": "1",
              "MaxOutstandingR2T": "1",
              "MaxRecvDataSegmentLength": "8192",
              "MaxXmitDataSegmentLength": "262144",
              "OFMarkInt": "2048~65535",
              "OFMarker": "No",
              "TargetAlias": "LIO Target"
            },
            "portals": [
              {
                "ip_address": "10.110.88.59",
                "iser": false,
                "port": 3260
              }
            ],
            "tag": 1
          }
        ],
        "wwn": "iqn.2016-09.com.example:iscsitgt01-0001"
      },
      {
        "fabric": "iscsi",
```

```
33380         "tpgs": [
33390           {
33400             "attributes": {
33410               "authentication": 0,
33420               "cache_dynamic_acls": 0,
33430               "default_cmdsn_depth": 128,
33440               "default_erl": 0,
33450               "demo_mode_discovery": 1,
33460               "demo_mode_write_protect": 1,
33470               "fabric_prot_type": 0,
33480               "generate_node_acls": 0,
33490               "login_timeout": 15,
33500               "netif_timeout": 2,
33510               "prod_mode_write_protect": 0,
33520               "t10_pi": 0
33530             },
33540             "enable": true,
33550             "luns": [
33560               {
33570                 "index": 0,
33580                 "storage_object": "/backstores/block/lun0000"
33590               }
33600             ],
33610             "node_acls": [
33620               {
33630                 "attributes": {
33640                   "dataout_timeout": 3,
33650                   "dataout_timeout_retries": 5,
33660                   "default_erl": 0,
33670                   "nopin_response_timeout": 30,
33680                   "nopin_timeout": 15,
33690                   "random_datain_pdu_offsets": 0,
33700                   "random_datain_seq_offsets": 0,
33710                   "random_r2t_offsets": 0
33720                 },
33730                 "chap_password": "password-user04",
33740                 "chap_userid": "iscsiuser04",
33750                 "mapped_luns": [
33760                   {
33770                     "index": 0,
```

```
33780                     "tpg_lun": 0,
33790                     "write_protect": false
33800                   }
33810                 ],
33820                 "node_wwn": "iqn.2016-09.com.example:initiator04"
33830               },
33840               {
33850                 "attributes": {
33860                   "dataout_timeout": 3,
33870                   "dataout_timeout_retries": 5,
33880                   "default_erl": 0,
33890                   "nopin_response_timeout": 30,
33900                   "nopin_timeout": 15,
33910                   "random_datain_pdu_offsets": 0,
33920                   "random_datain_seq_offsets": 0,
33930                   "random_r2t_offsets": 0
33940                 },
33950                 "chap_password": "password-user03",
33960                 "chap_userid": "iscsiuser03",
33970                 "mapped_luns": [
33980                   {
33990                     "index": 0,
34000                     "tpg_lun": 0,
34010                     "write_protect": false
34020                   }
34030                 ],
34040                 "node_wwn": "iqn.2016-09.com.example:initiator03"
34050               },
34060               {
34070                 "attributes": {
34080                   "dataout_timeout": 3,
34090                   "dataout_timeout_retries": 5,
34100                   "default_erl": 0,
34110                   "nopin_response_timeout": 30,
34120                   "nopin_timeout": 15,
34130                   "random_datain_pdu_offsets": 0,
34140                   "random_datain_seq_offsets": 0,
34150                   "random_r2t_offsets": 0
34160                 },
34170                 "chap_password": "password-user02",
```

```
      "chap_userid": "iscsiuser02",
      "mapped_luns": [
        {
          "index": 0,
          "tpg_lun": 0,
          "write_protect": false
        }
      ],
      "node_wwn": "iqn.2016-09.com.example:initiator02"
    },
    {
      "attributes": {
        "dataout_timeout": 3,
        "dataout_timeout_retries": 5,
        "default_erl": 0,
        "nopin_response_timeout": 30,
        "nopin_timeout": 15,
        "random_datain_pdu_offsets": 0,
        "random_datain_seq_offsets": 0,
        "random_r2t_offsets": 0
      },
      "chap_password": "password-user01",
      "chap_userid": "iscsiuser01",
      "mapped_luns": [
        {
          "index": 0,
          "tpg_lun": 0,
          "write_protect": false
        }
      ],
      "node_wwn": "iqn.2016-09.com.example:initiator01"
    }
  ],
  "parameters": {
    "AuthMethod": "CHAP,None",
    "DataDigest": "CRC32C,None",
    "DataPDUInOrder": "Yes",
    "DataSequenceInOrder": "Yes",
    "DefaultTime2Retain": "20",
    "DefaultTime2Wait": "2",
```

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                "ErrorRecoveryLevel": "0",
                "FirstBurstLength": "65536",
                "HeaderDigest": "CRC32C,None",
                "IFMarkInt": "2048~65535",
                "IFMarker": "No",
                "ImmediateData": "Yes",
                "InitialR2T": "Yes",
                "MaxBurstLength": "262144",
                "MaxConnections": "1",
                "MaxOutstandingR2T": "1",
                "MaxRecvDataSegmentLength": "8192",
                "MaxXmitDataSegmentLength": "262144",
                "OFMarkInt": "2048~65535",
                "OFMarker": "No",
                "TargetAlias": "LIO Target"
              },
              "portals": [
                {
                  "ip_address": "10.110.88.59",
                  "iser": false,
                  "port": 3260
                }
              ],
              "tag": 1
            }
          ],
          "wwn": "iqn.2016-09.com.example:iscsitgt01-0000"
        }
      ]
    }

    {
      "fabric_modules": [],
      "storage_objects": [
        {
          "attributes": {
            "block_size": 512,
            "emulate_3pc": 1,
            "emulate_caw": 1,
            "emulate_dpo": 0,
```

```
            "emulate_fua_read": 0,
            "emulate_fua_write": 1,
            "emulate_model_alias": 1,
            "emulate_rest_reord": 0,
            "emulate_tas": 1,
            "emulate_tpu": 0,
            "emulate_tpws": 0,
            "emulate_ua_intlck_ctrl": 0,
            "emulate_write_cache": 0,
            "enforce_pr_isids": 1,
            "force_pr_aptpl": 0,
            "is_nonrot": 0,
            "max_unmap_block_desc_count": 1,
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            "max_write_same_len": 65535,
            "optimal_sectors": 2048,
            "pi_prot_format": 0,
            "pi_prot_type": 0,
            "queue_depth": 128,
            "unmap_granularity": 2048,
            "unmap_granularity_alignment": 0
          },
          "dev": "/dev/vg1/lv-lun0003",
          "name": "lun0003",
          "plugin": "block",
          "readonly": false,
          "write_back": false,
          "wwn": "1ade2d3a-db39-4880-8e80-59d51ca87c60"
        },
        {
          "attributes": {
            "block_size": 512,
            "emulate_3pc": 1,
            "emulate_caw": 1,
            "emulate_dpo": 0,
            "emulate_fua_read": 0,
            "emulate_fua_write": 1,
            "emulate_model_alias": 1,
            "emulate_rest_reord": 0,
            "emulate_tas": 1,
```

```
35380             "emulate_tpu": 0,
35390             "emulate_tpws": 0,
35400             "emulate_ua_intlck_ctrl": 0,
35410             "emulate_write_cache": 0,
35420             "enforce_pr_isids": 1,
35430             "force_pr_aptpl": 0,
35440             "is_nonrot": 0,
35450             "max_unmap_block_desc_count": 1,
35460             "max_unmap_lba_count": 8192,
35470             "max_write_same_len": 65535,
35480             "optimal_sectors": 2048,
35490             "pi_prot_format": 0,
35500             "pi_prot_type": 0,
35510             "queue_depth": 128,
35520             "unmap_granularity": 2048,
35530             "unmap_granularity_alignment": 0
35540           },
35550           "dev": "/dev/vg1/lv-lun0002",
35560           "name": "lun0002",
35570           "plugin": "block",
35580           "readonly": false,
35590           "write_back": false,
35600           "wwn": "50907dc1-06ff-4e27-877a-b68ffe949fd7"
35610         },
35620         {
35630           "attributes": {
35640             "block_size": 512,
35650             "emulate_3pc": 1,
35660             "emulate_caw": 1,
35670             "emulate_dpo": 0,
35680             "emulate_fua_read": 0,
35690             "emulate_fua_write": 1,
35700             "emulate_model_alias": 1,
35710             "emulate_rest_reord": 0,
35720             "emulate_tas": 1,
35730             "emulate_tpu": 0,
35740             "emulate_tpws": 0,
35750             "emulate_ua_intlck_ctrl": 0,
35760             "emulate_write_cache": 0,
35770             "enforce_pr_isids": 1,
```

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            "is_nonrot": 0,
            "max_unmap_block_desc_count": 1,
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            "max_write_same_len": 65535,
            "optimal_sectors": 2048,
            "pi_prot_format": 0,
            "pi_prot_type": 0,
            "queue_depth": 128,
            "unmap_granularity": 2048,
            "unmap_granularity_alignment": 0
          },
          "dev": "/dev/vg1/lv-lun0001",
          "name": "lun0001",
          "plugin": "block",
          "readonly": false,
          "write_back": false,
          "wwn": "9a5889d7-4176-4e58-874e-46a15f47dc58"
        },
        {
          "attributes": {
            "block_size": 512,
            "emulate_3pc": 1,
            "emulate_caw": 1,
            "emulate_dpo": 0,
            "emulate_fua_read": 0,
            "emulate_fua_write": 1,
            "emulate_model_alias": 1,
            "emulate_rest_reord": 0,
            "emulate_tas": 1,
            "emulate_tpu": 0,
            "emulate_tpws": 0,
            "emulate_ua_intlck_ctrl": 0,
            "emulate_write_cache": 0,
            "enforce_pr_isids": 1,
            "force_pr_aptpl": 0,
            "is_nonrot": 0,
            "max_unmap_block_desc_count": 1,
            "max_unmap_lba_count": 8192,
            "max_write_same_len": 65535,
```

```
            "optimal_sectors": 2048,
            "pi_prot_format": 0,
            "pi_prot_type": 0,
            "queue_depth": 128,
            "unmap_granularity": 2048,
            "unmap_granularity_alignment": 0
          },
          "dev": "/dev/vg1/lv-lun0000",
          "name": "lun0000",
          "plugin": "block",
          "readonly": false,
          "write_back": false,
          "wwn": "b77302c8-9db8-4889-8353-b0493cababe5"
        }
      ],
      "targets": [
        {
          "fabric": "iscsi",
          "tpgs": [
            {
              "attributes": {
                "authentication": 0,
                "cache_dynamic_acls": 0,
                "default_cmdsn_depth": 128,
                "default_erl": 0,
                "demo_mode_discovery": 1,
                "demo_mode_write_protect": 1,
                "fabric_prot_type": 0,
                "generate_node_acls": 0,
                "login_timeout": 15,
                "netif_timeout": 2,
                "prod_mode_write_protect": 0,
                "t10_pi": 0
              },
              "enable": true,
              "luns": [
                {
                  "index": 0,
                  "storage_object": "/backstores/block/lun0003"
                }
```

```
            ],
            "node_acls": [
              {
                "attributes": {
                  "dataout_timeout": 3,
                  "dataout_timeout_retries": 5,
                  "default_erl": 0,
                  "nopin_response_timeout": 30,
                  "nopin_timeout": 15,
                  "random_datain_pdu_offsets": 0,
                  "random_datain_seq_offsets": 0,
                  "random_r2t_offsets": 0
                },
                "chap_password": "password-user04",
                "chap_userid": "iscsiuser04",
                "mapped_luns": [
                  {
                    "index": 0,
                    "tpg_lun": 0,
                    "write_protect": false
                  }
                ],
                "node_wwn": "iqn.2016-09.com.example:initiator04"
              },
              {
                "attributes": {
                  "dataout_timeout": 3,
                  "dataout_timeout_retries": 5,
                  "default_erl": 0,
                  "nopin_response_timeout": 30,
                  "nopin_timeout": 15,
                  "random_datain_pdu_offsets": 0,
                  "random_datain_seq_offsets": 0,
                  "random_r2t_offsets": 0
                },
                "mapped_luns": [
                  {
                    "index": 0,
                    "tpg_lun": 0,
                    "write_protect": false
```

```
36980                 }
36990               ],
37000               "node_wwn": "iqn.2016-09.com.example:initiator03"
37010             },
37020             {
37030               "attributes": {
37040                 "dataout_timeout": 3,
37050                 "dataout_timeout_retries": 5,
37060                 "default_erl": 0,
37070                 "nopin_response_timeout": 30,
37080                 "nopin_timeout": 15,
37090                 "random_datain_pdu_offsets": 0,
37100                 "random_datain_seq_offsets": 0,
37110                 "random_r2t_offsets": 0
37120               },
37130               "chap_password": "password-user02",
37140               "chap_userid": "iscsiuser02",
37150               "mapped_luns": [
37160                 {
37170                   "index": 0,
37180                   "tpg_lun": 0,
37190                   "write_protect": false
37200                 }
37210               ],
37220               "node_wwn": "iqn.2016-09.com.example:initiator02"
37230             },
37240             {
37250               "attributes": {
37260                 "dataout_timeout": 3,
37270                 "dataout_timeout_retries": 5,
37280                 "default_erl": 0,
37290                 "nopin_response_timeout": 30,
37300                 "nopin_timeout": 15,
37310                 "random_datain_pdu_offsets": 0,
37320                 "random_datain_seq_offsets": 0,
37330                 "random_r2t_offsets": 0
37340               },
37350               "chap_password": "password-user01",
37360               "chap_userid": "iscsiuser01",
37370               "mapped_luns": [
```

```
            {
              "index": 0,
              "tpg_lun": 0,
              "write_protect": false
            }
          ],
          "node_wwn": "iqn.2016-09.com.example:initiator01"
        }
      ],
      "parameters": {
        "AuthMethod": "CHAP,None",
        "DataDigest": "CRC32C,None",
        "DataPDUInOrder": "Yes",
        "DataSequenceInOrder": "Yes",
        "DefaultTime2Retain": "20",
        "DefaultTime2Wait": "2",
        "ErrorRecoveryLevel": "0",
        "FirstBurstLength": "65536",
        "HeaderDigest": "CRC32C,None",
        "IFMarkInt": "2048~65535",
        "IFMarker": "No",
        "ImmediateData": "Yes",
        "InitialR2T": "Yes",
        "MaxBurstLength": "262144",
        "MaxConnections": "1",
        "MaxOutstandingR2T": "1",
        "MaxRecvDataSegmentLength": "8192",
        "MaxXmitDataSegmentLength": "262144",
        "OFMarkInt": "2048~65535",
        "OFMarker": "No",
        "TargetAlias": "LIO Target"
      },
      "portals": [
        {
          "ip_address": "10.110.88.59",
          "iser": false,
          "port": 3260
        }
      ],
      "tag": 1
```

```
            }
          ],
          "wwn": "iqn.2016-09.com.example:iscsitgt01-0003"
        },
        {
          "fabric": "iscsi",
          "tpgs": [
            {
              "attributes": {
                "authentication": 0,
                "cache_dynamic_acls": 0,
                "default_cmdsn_depth": 128,
                "default_erl": 0,
                "demo_mode_discovery": 1,
                "demo_mode_write_protect": 1,
                "fabric_prot_type": 0,
                "generate_node_acls": 0,
                "login_timeout": 15,
                "netif_timeout": 2,
                "prod_mode_write_protect": 0,
                "t10_pi": 0
              },
              "enable": true,
              "luns": [
                {
                  "index": 0,
                  "storage_object": "/backstores/block/lun0002"
                }
              ],
              "node_acls": [
                {
                  "attributes": {
                    "dataout_timeout": 3,
                    "dataout_timeout_retries": 5,
                    "default_erl": 0,
                    "nopin_response_timeout": 30,
                    "nopin_timeout": 15,
                    "random_datain_pdu_offsets": 0,
                    "random_datain_seq_offsets": 0,
                    "random_r2t_offsets": 0
```

```
      },
      "chap_password": "password-user04",
      "chap_userid": "iscsiuser04",
      "mapped_luns": [
        {
          "index": 0,
          "tpg_lun": 0,
          "write_protect": false
        }
      ],
      "node_wwn": "iqn.2016-09.com.example:initiator04"
    },
    {
      "attributes": {
        "dataout_timeout": 3,
        "dataout_timeout_retries": 5,
        "default_erl": 0,
        "nopin_response_timeout": 30,
        "nopin_timeout": 15,
        "random_datain_pdu_offsets": 0,
        "random_datain_seq_offsets": 0,
        "random_r2t_offsets": 0
      },
      "mapped_luns": [
        {
          "index": 0,
          "tpg_lun": 0,
          "write_protect": false
        }
      ],
      "node_wwn": "iqn.2016-09.com.example:initiator03"
    },
    {
      "attributes": {
        "dataout_timeout": 3,
        "dataout_timeout_retries": 5,
        "default_erl": 0,
        "nopin_response_timeout": 30,
        "nopin_timeout": 15,
        "random_datain_pdu_offsets": 0,
```

```
            "random_datain_seq_offsets": 0,
            "random_r2t_offsets": 0
          },
          "chap_password": "password-user02",
          "chap_userid": "iscsiuser02",
          "mapped_luns": [
            {
              "index": 0,
              "tpg_lun": 0,
              "write_protect": false
            }
          ],
          "node_wwn": "iqn.2016-09.com.example:initiator02"
        },
        {
          "attributes": {
            "dataout_timeout": 3,
            "dataout_timeout_retries": 5,
            "default_erl": 0,
            "nopin_response_timeout": 30,
            "nopin_timeout": 15,
            "random_datain_pdu_offsets": 0,
            "random_datain_seq_offsets": 0,
            "random_r2t_offsets": 0
          },
          "chap_password": "password-user01",
          "chap_userid": "iscsiuser01",
          "mapped_luns": [
            {
              "index": 0,
              "tpg_lun": 0,
              "write_protect": false
            }
          ],
          "node_wwn": "iqn.2016-09.com.example:initiator01"
        }
      ],
      "parameters": {
        "AuthMethod": "CHAP,None",
        "DataDigest": "CRC32C,None",
```

```
                "DataPDUInOrder": "Yes",
                "DataSequenceInOrder": "Yes",
                "DefaultTime2Retain": "20",
                "DefaultTime2Wait": "2",
                "ErrorRecoveryLevel": "0",
                "FirstBurstLength": "65536",
                "HeaderDigest": "CRC32C,None",
                "IFMarkInt": "2048~65535",
                "IFMarker": "No",
                "ImmediateData": "Yes",
                "InitialR2T": "Yes",
                "MaxBurstLength": "262144",
                "MaxConnections": "1",
                "MaxOutstandingR2T": "1",
                "MaxRecvDataSegmentLength": "8192",
                "MaxXmitDataSegmentLength": "262144",
                "OFMarkInt": "2048~65535",
                "OFMarker": "No",
                "TargetAlias": "LIO Target"
              },
              "portals": [
                {
                  "ip_address": "10.110.88.59",
                  "iser": false,
                  "port": 3260
                }
              ],
              "tag": 1
            }
          ],
          "wwn": "iqn.2016-09.com.example:iscsitgt01-0002"
        },
        {
          "fabric": "iscsi",
          "tpgs": [
            {
              "attributes": {
                "authentication": 0,
                "cache_dynamic_acls": 0,
                "default_cmdsn_depth": 128,
```

```
      "default_erl": 0,
      "demo_mode_discovery": 1,
      "demo_mode_write_protect": 1,
      "fabric_prot_type": 0,
      "generate_node_acls": 0,
      "login_timeout": 15,
      "netif_timeout": 2,
      "prod_mode_write_protect": 0,
      "t10_pi": 0
    },
    "enable": true,
    "luns": [
      {
        "index": 0,
        "storage_object": "/backstores/block/lun0001"
      }
    ],
    "node_acls": [
      {
        "attributes": {
          "dataout_timeout": 3,
          "dataout_timeout_retries": 5,
          "default_erl": 0,
          "nopin_response_timeout": 30,
          "nopin_timeout": 15,
          "random_datain_pdu_offsets": 0,
          "random_datain_seq_offsets": 0,
          "random_r2t_offsets": 0
        },
        "chap_password": "password-user04",
        "chap_userid": "iscsiuser04",
        "mapped_luns": [
          {
            "index": 0,
            "tpg_lun": 0,
            "write_protect": false
          }
        ],
        "node_wwn": "iqn.2016-09.com.example:initiator04"
      },
```

```
    {
      "attributes": {
        "dataout_timeout": 3,
        "dataout_timeout_retries": 5,
        "default_erl": 0,
        "nopin_response_timeout": 30,
        "nopin_timeout": 15,
        "random_datain_pdu_offsets": 0,
        "random_datain_seq_offsets": 0,
        "random_r2t_offsets": 0
      },
      "chap_password": "password-user03",
      "chap_userid": "iscsiuser03",
      "mapped_luns": [
        {
          "index": 0,
          "tpg_lun": 0,
          "write_protect": false
        }
      ],
      "node_wwn": "iqn.2016-09.com.example:initiator03"
    },
    {
      "attributes": {
        "dataout_timeout": 3,
        "dataout_timeout_retries": 5,
        "default_erl": 0,
        "nopin_response_timeout": 30,
        "nopin_timeout": 15,
        "random_datain_pdu_offsets": 0,
        "random_datain_seq_offsets": 0,
        "random_r2t_offsets": 0
      },
      "chap_password": "password-user02",
      "chap_userid": "iscsiuser02",
      "mapped_luns": [
        {
          "index": 0,
          "tpg_lun": 0,
          "write_protect": false
```

```
                    }
                  ],
                  "node_wwn": "iqn.2016-09.com.example:initiator02"
                },
                {
                  "attributes": {
                    "dataout_timeout": 3,
                    "dataout_timeout_retries": 5,
                    "default_erl": 0,
                    "nopin_response_timeout": 30,
                    "nopin_timeout": 15,
                    "random_datain_pdu_offsets": 0,
                    "random_datain_seq_offsets": 0,
                    "random_r2t_offsets": 0
                  },
                  "chap_password": "password-user01",
                  "chap_userid": "iscsiuser01",
                  "mapped_luns": [
                    {
                      "index": 0,
                      "tpg_lun": 0,
                      "write_protect": false
                    }
                  ],
                  "node_wwn": "iqn.2016-09.com.example:initiator01"
                }
              ],
              "parameters": {
                "AuthMethod": "CHAP,None",
                "DataDigest": "CRC32C,None",
                "DataPDUInOrder": "Yes",
                "DataSequenceInOrder": "Yes",
                "DefaultTime2Retain": "20",
                "DefaultTime2Wait": "2",
                "ErrorRecoveryLevel": "0",
                "FirstBurstLength": "65536",
                "HeaderDigest": "CRC32C,None",
                "IFMarkInt": "2048~65535",
                "IFMarker": "No",
                "ImmediateData": "Yes",
```

```
                "InitialR2T": "Yes",
                "MaxBurstLength": "262144",
                "MaxConnections": "1",
                "MaxOutstandingR2T": "1",
                "MaxRecvDataSegmentLength": "8192",
                "MaxXmitDataSegmentLength": "262144",
                "OFMarkInt": "2048~65535",
                "OFMarker": "No",
                "TargetAlias": "LIO Target"
              },
              "portals": [
                {
                  "ip_address": "10.110.88.59",
                  "iser": false,
                  "port": 3260
                }
              ],
              "tag": 1
            }
          ],
          "wwn": "iqn.2016-09.com.example:iscsitgt01-0001"
        },
        {
          "fabric": "iscsi",
          "tpgs": [
            {
              "attributes": {
                "authentication": 0,
                "cache_dynamic_acls": 0,
                "default_cmdsn_depth": 128,
                "default_erl": 0,
                "demo_mode_discovery": 1,
                "demo_mode_write_protect": 1,
                "fabric_prot_type": 0,
                "generate_node_acls": 0,
                "login_timeout": 15,
                "netif_timeout": 2,
                "prod_mode_write_protect": 0,
                "t10_pi": 0
              },
```

```
            "enable": true,
            "luns": [
              {
                "index": 0,
                "storage_object": "/backstores/block/lun0000"
              }
            ],
            "node_acls": [
              {
                "attributes": {
                  "dataout_timeout": 3,
                  "dataout_timeout_retries": 5,
                  "default_erl": 0,
                  "nopin_response_timeout": 30,
                  "nopin_timeout": 15,
                  "random_datain_pdu_offsets": 0,
                  "random_datain_seq_offsets": 0,
                  "random_r2t_offsets": 0
                },
                "chap_password": "password-user04",
                "chap_userid": "iscsiuser04",
                "mapped_luns": [
                  {
                    "index": 0,
                    "tpg_lun": 0,
                    "write_protect": false
                  }
                ],
                "node_wwn": "iqn.2016-09.com.example:initiator04"
              },
              {
                "attributes": {
                  "dataout_timeout": 3,
                  "dataout_timeout_retries": 5,
                  "default_erl": 0,
                  "nopin_response_timeout": 30,
                  "nopin_timeout": 15,
                  "random_datain_pdu_offsets": 0,
                  "random_datain_seq_offsets": 0,
                  "random_r2t_offsets": 0
```

```
      },
      "chap_password": "password-user03",
      "chap_userid": "iscsiuser03",
      "mapped_luns": [
        {
          "index": 0,
          "tpg_lun": 0,
          "write_protect": false
        }
      ],
      "node_wwn": "iqn.2016-09.com.example:initiator03"
    },
    {
      "attributes": {
        "dataout_timeout": 3,
        "dataout_timeout_retries": 5,
        "default_erl": 0,
        "nopin_response_timeout": 30,
        "nopin_timeout": 15,
        "random_datain_pdu_offsets": 0,
        "random_datain_seq_offsets": 0,
        "random_r2t_offsets": 0
      },
      "chap_password": "password-user02",
      "chap_userid": "iscsiuser02",
      "mapped_luns": [
        {
          "index": 0,
          "tpg_lun": 0,
          "write_protect": false
        }
      ],
      "node_wwn": "iqn.2016-09.com.example:initiator02"
    },
    {
      "attributes": {
        "dataout_timeout": 3,
        "dataout_timeout_retries": 5,
        "default_erl": 0,
        "nopin_response_timeout": 30,
```

```
                    "nopin_timeout": 15,
                    "random_datain_pdu_offsets": 0,
                    "random_datain_seq_offsets": 0,
                    "random_r2t_offsets": 0
                  },
                  "chap_password": "password-user01",
                  "chap_userid": "iscsiuser01",
                  "mapped_luns": [
                    {
                      "index": 0,
                      "tpg_lun": 0,
                      "write_protect": false
                    }
                  ],
                  "node_wwn": "iqn.2016-09.com.example:initiator01"
                }
              ],
              "parameters": {
                "AuthMethod": "CHAP,None",
                "DataDigest": "CRC32C,None",
                "DataPDUInOrder": "Yes",
                "DataSequenceInOrder": "Yes",
                "DefaultTime2Retain": "20",
                "DefaultTime2Wait": "2",
                "ErrorRecoveryLevel": "0",
                "FirstBurstLength": "65536",
                "HeaderDigest": "CRC32C,None",
                "IFMarkInt": "2048~65535",
                "IFMarker": "No",
                "ImmediateData": "Yes",
                "InitialR2T": "Yes",
                "MaxBurstLength": "262144",
                "MaxConnections": "1",
                "MaxOutstandingR2T": "1",
                "MaxRecvDataSegmentLength": "8192",
                "MaxXmitDataSegmentLength": "262144",
                "OFMarkInt": "2048~65535",
                "OFMarker": "No",
                "TargetAlias": "LIO Target"
              },
```

```
              "portals": [
                {
                  "ip_address": "10.110.88.59",
                  "iser": false,
                  "port": 3260
                }
              ],
              "tag": 1
            }
          ],
          "wwn": "iqn.2016-09.com.example:iscsitgt01-0000"
        }
      ]
    }
```

○ Active 機で、LIO の設定をクリアします。

a
```
sudo targetctl clear
```

a
```
sudo targetcli ls /
o- / ......................................................................... [...]
  o- backstores .............................................................. [...]
  | o- block .................................... [Storage Objects: 0]
  | o- fileio ................................... [Storage Objects: 0]
  | o- pscsi .................................... [Storage Objects: 0]
  | o- ramdisk .................................. [Storage Objects: 0]
  o- iscsi ................................................................ [Targets: 0]
  o- loopback ............................................................. [Targets: 0]
```

○ Active 機で、DRBD 上の LVM ボリュームグループを非活性化します。

a
```
sudo vgchange -a n vg1
  0 logical volume(s) in volume group "vg1" now active
```

a
```
sudo lvs
  LV       VG   Attr       LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  lv-drbd0 vg0  -wi-ao---- 359.98g
  lv-lun0  vg1  -wi------- 323.97g
  lv-lun1  vg1  -wi-------   7.20g
  lv-lun2  vg1  -wi-------   7.20g
```

```
42580         lv-lun3  vg1  -wi-------   7.20g
42590
42600   ○   Active 機で、DRBD リソースを secondary 化（デモート）します。
42610
42620    a  sudo drbdadm secondary all
42630
42640   ○   Stand-by 機で、DRBD の状態を確認し、「Ctrl + C」を押下してワッチを停止します。
42650
42660       Every 2.0s: cat /proc/drbd                                  Fri Nov 25 22:23:08 2016
42670
42680       version: 8.4.5 (api:1/proto:86-101)
42690       srcversion: 1AEFF755B8BD61B81A0AF27
42700    s   0: cs:Connected ro:Secondary/Secondary ds:UpToDate/UpToDate C r-----
42710           ns:0 nr:228 dw:228 dr:377459420 al:0 bm:0 lo:0 pe:0 ua:0 ap:0 ep:1 wo:f oos:0
42720
42730   ○   Active 機と Stand-by 機で、drbd.service を停止します。
42740
42750 a, s  sudo systemctl stop drbd.service
42760
42770 a, s  cat /proc/drbd
42780       cat: /proc/drbd: No such file or directory
42790
42800   ○   Active 機で、Corosync の認証を設定し、起動します。
42810
42820    a  sudo pcs cluster auth iscsitgt01a.example.com iscsitgt01s.example.com 10.110.88.57 10.110.88.58 ¥
42830    a   192.168.1.2 192.168.1.3 -u hacluster -p 'password' --force
42840       iscsitgt01s.example.com: Authorized
42850       iscsitgt01a.example.com: Authorized
42860       10.110.88.58: Authorized
42870       192.168.1.2: Authorized
42880       192.168.1.3: Authorized
42890       10.110.88.57: Authorized
42900
42910    a  sudo cat /var/lib/pcsd/tokens
42920       {
42930         "format_version": 2,
42940         "data_version": 4,
42950         "tokens": {
42960           "10.110.88.57": "77189e9e-3be0-40ce-b81e-3e5e6525e885",
42970           "10.110.88.58": "9e3f4ae9-b15e-49c9-b6ee-eb8c1b91783a",
```

```
42980           "192.168.1.2": "53da862f-ad22-445b-8887-add50d385736",
42990           "192.168.1.3": "4f78d9c6-34a4-4486-8ba1-e69f0d4e1257",
43000           "iscsitgt01a.example.com": "002cd1c0-2ab2-4a4c-a1a7-4bf14b61b822",
43010           "iscsitgt01s.example.com": "1a9981a9-04e6-461b-b904-c5df8b4c9815"
43020         }
43030       }
43040
43050   a   sudo pcs cluster setup --name iscsitgt01 10.110.88.57,192.168.1.2 10.110.88.58,192.168.1.3 ¥
43060   a    --transport=udp --rrpmode=passive -u hacluster -p 'password' --force
43070       Shutting down pacemaker/corosync services...
43080       Redirecting to /bin/systemctl stop  pacemaker.service
43090       Redirecting to /bin/systemctl stop  corosync.service
43100       Killing any remaining services...
43110       Removing all cluster configuration files...
43120       10.110.88.57: Succeeded
43130       10.110.88.58: Succeeded
43140       Synchronizing pcsd certificates on nodes 10.110.88.57, 10.110.88.58...
43150       10.110.88.57: Success
43160       10.110.88.58: Success
43170
43180       Restaring pcsd on the nodes in order to reload the certificates...
43190       10.110.88.57: Success
43200       10.110.88.58: Success
43210
43220   a   cat /etc/corosync/corosync.conf
43230       totem {
43240           version: 2
43250           secauth: off
43260           cluster_name: iscsitgt01
43270           transport: udp
43280           rrp_mode: passive
43290       }
43300
43310       nodelist {
43320           node {
43330               ring0_addr: 10.110.88.57
43340               ring1_addr: 192.168.1.2
43350               nodeid: 1
43360           }
43370
```

```
43380           node {
43390               ring0_addr: 10.110.88.58
43400               ring1_addr: 192.168.1.3
43410               nodeid: 2
43420           }
43430       }
43440
43450       quorum {
43460           provider: corosync_votequorum
43470           two_node: 1
43480       }
43490
43500       logging {
43510           to_logfile: yes
43520           logfile: /var/log/cluster/corosync.log
43530           to_syslog: yes
43540       }
43550
43560   a   sudo pcs cluster start --all
43570       10.110.88.57: Starting Cluster...
43580       10.110.88.58: Starting Cluster...
43590
43600   a   sudo pcs status corosync
43610       Membership information
43620       ----------------------
43630           Nodeid      Votes Name
43640                1          1 10.110.88.57 (local)
43650                2          1 10.110.88.58
43660
43670   a   sudo pcs status
43680       Cluster name: iscsitgt01
43690       WARNING: no stonith devices and stonith-enabled is not false
43700       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
43710       Stack: corosync
43720       Current DC: iscsitgt01a.example.com (version 1.1.15-11.el7-e174ec8) - partition with quorum
43730       Last updated: Fri Nov 25 22:26:31 2016          Last change: Fri Nov 25 22:26:26 2016 by hacluster via crmd on iscsitgt01a.example.com
43740
43750       2 nodes and 0 resources configured
43760
43770       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
```

```
43780
43790       No resources
43800
43810       Daemon Status:
43820         corosync: active/disabled
43830         pacemaker: active/disabled
43840         pcsd: active/enabled
43850
43860           ※  「Current DC」が表示されるまで、何回か実行します。20秒以上かかるものと思われます。
43870           ※  「Current DC」については、どちらが選ばれていてもあまり意味のある情報ではないので気にしないでください。
43880           ※  「WARNING」について、前者は後で対応します。後者は pcs のバグ（RRP mode 未対応）なので無視してください。
43890
43900   ○   Active 機と Stand-by 機で、Corosync の状態とプロセスを確認します。
43910
43920    a  sudo corosync-cfgtool -s
43930       Printing ring status.
43940       Local node ID 1
43950       RING ID 0
43960               id      = 10.110.88.57
43970               status  = ring 0 active with no faults
43980       RING ID 1
43990               id      = 192.168.1.2
44000               status  = ring 1 active with no faults
44010
44020    s  sudo corosync-cfgtool -s
44030       Printing ring status.
44040       Local node ID 2
44050       RING ID 0
44060               id      = 10.110.88.58
44070               status  = ring 0 active with no faults
44080       RING ID 1
44090               id      = 192.168.1.3
44100               status  = ring 1 active with no faults
44110
44120 a,s  ps -ef | egrep '[c]orosync|[p]acemaker'
44130       root      27483      1  0 22:26 ?        00:00:02 corosync
44140       root      27499      1  0 22:26 ?        00:00:00 /usr/sbin/pacemakerd -f
44150       haclust+  27500  27499  0 22:26 ?        00:00:00 /usr/libexec/pacemaker/cib
44160       root      27501  27499  0 22:26 ?        00:00:00 /usr/libexec/pacemaker/stonithd
44170       root      27502  27499  0 22:26 ?        00:00:00 /usr/libexec/pacemaker/lrmd
```

```
44180       haclust+  27503  27499  0 22:26 ?        00:00:00 /usr/libexec/pacemaker/attrd
44190       haclust+  27504  27499  0 22:26 ?        00:00:00 /usr/libexec/pacemaker/pengine
44200       haclust+  27505  27499  0 22:26 ?        00:00:00 /usr/libexec/pacemaker/crmd
44210
44220   ○   Active 機で、クラスタにリソースを登録します。
44230
44240    a  sudo /etc/ha.d/crm.sh
44250       Adding ms_drbd_r0 p_lvm (kind: Mandatory) (Options: first-action=promote then-action=start)
44260
44270   ○   Active 機で、状態を確認します。
44280
44290    a  sudo pcs status
44300       Cluster name: iscsitgt01
44310       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
44320       Stack: corosync
44330       Current DC: iscsitgt01a.example.com (version 1.1.15-11.el7-e174ec8) - partition with quorum
44340       Last updated: Fri Nov 25 22:31:49 2016          Last change: Fri Nov 25 22:31:30 2016 by root via cibadmin on iscsitgt01s.example.com
44350
44360       2 nodes and 5 resources configured
44370
44380       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
44390
44400       Full list of resources:
44410
44420        Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
44430            p_drbd_r0  (ocf::linbit:drbd):     FAILED iscsitgt01a.example.com (unmanaged)
44440            p_drbd_r0  (ocf::linbit:drbd):     FAILED iscsitgt01s.example.com (unmanaged)
44450        Resource Group: g_tgt
44460            p_lvm      (ocf::heartbeat:LVM):   Stopped
44470            p_lio      (ocf::heartbeat:LIO):   Stopped
44480            p_vip      (ocf::heartbeat:VIP):   Stopped
44490
44500       Failed Actions:
44510       * p_drbd_r0_stop_0 on iscsitgt01a.example.com 'not configured' (6): call=6, status=complete, exitreason='none',
44520           last-rc-change='Sat Oct 29 18:33:24 2016', queued=0ms, exec=24ms
44530       * p_lvm_start_0 on iscsitgt01a.example.com 'unknown error' (1): call=11, status=complete, exitreason='Volume group
44540        [vg1] does not exist or contains error!   Volume group "vg1" not found',
44550           last-rc-change='Sat Oct 29 18:33:24 2016', queued=0ms, exec=101ms
44560       * p_drbd_r0_stop_0 on iscsitgt01s.example.com 'not configured' (6): call=6, status=complete, exitreason='none',
44570           last-rc-change='Sat Oct 29 18:33:24 2016', queued=0ms, exec=23ms
```

```
    * p_lvm_start_0 on iscsitgt01s.example.com 'unknown error' (1): call=15, status=complete, exitreason='Volume group
     [vg1] does not exist or contains error!   Volume group "vg1" not found',
        last-rc-change='Tue Oct 29 18:33:24 2016', queued=0ms, exec=190ms

    Daemon Status:
      corosync: active/disabled
      pacemaker: active/disabled
      pcsd: active/enabled
```

○ Active 機で、リソースのエラー情報をクリアします。

a
```
sudo pcs resource cleanup
Waiting for 1 replies from the CRMd. OK
```

○ Active 機で、状態を確認します。

a
```
sudo pcs status
Cluster name: iscsitgt01
WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
Stack: corosync
Current DC: iscsitgt01a.example.com (version 1.1.15-11.el7-e174ec8) - partition with quorum
Last updated: Fri Nov 25 22:35:07 2016          Last change: Fri Nov 25 22:31:30 2016 by hacluster via crmd on iscsitgt01s.example.com

2 nodes and 5 resources configured

Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]

Full list of resources:

 Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
     Masters: [ iscsitgt01a.example.com ]
     Slaves: [ iscsitgt01s.example.com ]
 Resource Group: g_tgt
     p_lvm      (ocf::heartbeat:LVM):   Started iscsitgt01a.example.com
     p_lio      (ocf::heartbeat:LIO):   Started iscsitgt01a.example.com
     p_vip      (ocf::heartbeat:VIP):   Started iscsitgt01a.example.com

Daemon Status:
  corosync: active/disabled
  pacemaker: active/disabled
```

```
44980         pcsd: active/enabled
44990
45000   ○   Active 機と Stand-by 機で、設定情報を保存します。
45010
45020 a,s    sudo pcs config | sudo tee /etc/ha.d/crm.conf
45030        Cluster Name: iscsitgt01
45040        Corosync Nodes:
45050         10.110.88.57 10.110.88.58
45060        Pacemaker Nodes:
45070         iscsitgt01a.example.com iscsitgt01s.example.com
45080
45090        Resources:
45100         Master: ms_drbd_r0
45110          Meta Attrs: master-node-max=1 clone-max=2 clone-node-max=1 master-max=1 notify=true target-role=Started is-managed=true
45120          Resource: p_drbd_r0 (class=ocf provider=linbit type=drbd)
45130           Attributes: drbd_resource=r0
45140           Operations: start interval=0s timeout=240 (p_drbd_r0-start-interval-0s)
45150                       monitor interval=10 role=Master timeout=20 (p_drbd_r0-monitor-interval-10)
45160                       monitor interval=20 role=Slave timeout=20 (p_drbd_r0-monitor-interval-20)
45170                       notify interval=0s timeout=90 (p_drbd_r0-notify-interval-0s)
45180                       stop interval=0s timeout=100 (p_drbd_r0-stop-interval-0s)
45190                       promote interval=0s timeout=90 (p_drbd_r0-promote-interval-0s)
45200                       demote interval=0s timeout=90 (p_drbd_r0-demote-interval-0s)
45210         Group: g_tgt
45220          Resource: p_lvm (class=ocf provider=heartbeat type=LVM)
45230           Attributes: volgrpname=vg1
45240           Operations: start interval=0s timeout=30 (p_lvm-start-interval-0s)
45250                       monitor interval=5 timeout=10 (p_lvm-monitor-interval-5)
45260                       stop interval=0s timeout=30 (p_lvm-stop-interval-0s)
45270          Resource: p_lio (class=ocf provider=heartbeat type=LIO)
45280           Operations: start interval=0s timeout=10 (p_lio-start-interval-0s)
45290                       monitor interval=5 timeout=5 (p_lio-monitor-interval-5)
45300                       stop interval=0s timeout=10 (p_lio-stop-interval-0s)
45310          Resource: p_vip (class=ocf provider=heartbeat type=VIP)
45320           Attributes: ip=10.110.88.59 cidr_netmask=26 nic=bond0 iflabel=1 arp_interval=200 arp_count=5
45330           Operations: start interval=0s timeout=20 (p_vip-start-interval-0s)
45340                       monitor interval=5 timeout=10 (p_vip-monitor-interval-5)
45350                       stop interval=0s timeout=20 (p_vip-stop-interval-0s)
45360
45370        Stonith Devices:
```

```
Fencing Levels:

Location Constraints:
  Resource: g_tgt
    Enabled on: iscsitgt01a.example.com (score:100) (id:lc_tgt)
Ordering Constraints:
  promote ms_drbd_r0 then start p_lvm (kind:Mandatory) (id:order-ms_drbd_r0-p_lvm-mandatory)
Colocation Constraints:
  g_tgt with ms_drbd_r0 (score:INFINITY) (with-rsc-role:Master) (id:colocation-g_tgt-ms_drbd_r0-INFINITY)
Ticket Constraints:

Alerts:
 No alerts defined

Resources Defaults:
 resource-stickiness: 200
 migration-threshold: 2
Operations Defaults:
 No defaults set

Cluster Properties:
 batch-limit: 30
 cluster-delay: 60
 cluster-infrastructure: corosync
 cluster-name: iscsitgt01
 cluster-recheck-interval: 15min
 crmd-finalization-timeout: 30min
 crmd-integration-timeout: 3min
 crmd-transition-delay: 0s
 dc-deadtime: 20s
 dc-version: 1.1.15-11.el7-e174ec8
 default-action-timeout: 20
 election-timeout: 2min
 enable-acl: true
 enable-startup-probes: true
 have-watchdog: false
 is-managed-default: true
 load-threshold: 80%
 maintenance-mode: false
 migration-limit: -1
```

```
45780         no-quorum-policy: ignore
45790         node-action-limit: 0
45800         node-health-green: 0
45810         node-health-red: -INFINITY
45820         node-health-strategy: none
45830         node-health-yellow: 0
45840         notification-agent: /dev/null
45850         pe-error-series-max: 100
45860         pe-input-series-max: 100
45870         pe-warn-series-max: 100
45880         placement-strategy: default
45890         remove-after-stop: false
45900         shutdown-escalation: 20min
45910         start-failure-is-fatal: true
45920         startup-fencing: true
45930         stonith-action: reboot
45940         stonith-enabled: false
45950         stonith-timeout: 60
45960         stop-all-resources: false
45970         stop-orphan-actions: true
45980         stop-orphan-resources: true
45990         symmetric-cluster: true
46000
46010       Quorum:
46020         Options:
46030
46040 a,s    sudo cp -a /etc{,~}/ha.d/crm.conf
46050
46060   ○    Active 機で、スイッチオーバ（手動フェイルオーバ）させます。
46070
46080    a   sudo pcs resource move g_tgt
46090        Warning: Creating location constraint cli-ban-g_tgt-on-iscsitgt01a.example.com with a score of -INFINITY for resource g_tgt on
46100         node iscsitgt01a.example.com.
46110        This will prevent g_tgt from running on iscsitgt01a.example.com until the constraint is removed. This will be the case even if
46120         iscsitgt01a.example.com is the last node in the cluster.
46130
46140   ○    Active 機で、状態を確認します。
46150
46160    a   sudo pcs status
46170        Cluster name: iscsitgt01
```

```
46180       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
46190       Stack: corosync
46200       Current DC: iscsitgt01a.example.com (version 1.1.15-11.el7-e174ec8) - partition with quorum
46210       Last updated: Fri Nov 25 22:45:12 2016          Last change: Fri Nov 25 22:44:04 2016 by root via crm_resource on iscsitgt01a.example.com
46220
46230       2 nodes and 5 resources configured
46240
46250       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
46260
46270       Full list of resources:
46280
46290        Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
46300            Masters: [ iscsitgt01s.example.com ]
46310            Slaves: [ iscsitgt01a.example.com ]
46320        Resource Group: g_tgt
46330            p_lvm      (ocf::heartbeat:LVM):   Started iscsitgt01s.example.com
46340            p_lio      (ocf::heartbeat:LIO):   Started iscsitgt01s.example.com
46350            p_vip      (ocf::heartbeat:VIP):   Started iscsitgt01s.example.com
46360
46370       Daemon Status:
46380         corosync: active/disabled
46390         pacemaker: active/disabled
46400         pcsd: active/enabled
46410
46420           ※  「p_vip」のノードが変わるまで、何回か実行します。
46430
46440   ○   Active 機で、設定変更を確認します。
46450
46460    a  diff <(grep -v last-lrm-refresh /etc/ha.d/crm.conf) <(sudo pcs config | grep -v last-lrm-refresh)
46470       40a41
46480       >     Disabled on: iscsitgt01a.example.com (score:-INFINITY) (role: Started) (id:cli-ban-g_tgt-on-iscsitgt01a.example.com)
46490
46500   ○   Active 機で、設定変更を元に戻します。
46510
46520    a  sudo pcs resource clear g_tgt
46530    a  diff <(grep -v last-lrm-refresh /etc/ha.d/crm.conf) <(sudo pcs config | grep -v last-lrm-refresh)
46540
46550   ○   Active 機でリソースが起動した状態でない場合のみ、スイッチバック（フェイルバック）させます。
46560
46570    a  sudo pcs resource move g_tgt; sleep 5; sudo pcs resource clear g_tgt
```

```
46580       Warning: Creating location constraint cli-ban-g_tgt-on-iscsitgt01s.example.com with a score of -INFINITY for resource g_tgt on
46590        node iscsitgt01s.example.com.
46600       This will prevent g_tgt from running on iscsitgt01s.example.com until the constraint is removed. This will be the case even if
46610        iscsitgt01s.example.com is the last node in the cluster.
46620
46630   ○   Active 機で、状態を確認します。
46640
46650    a  sudo pcs status
46660       Cluster name: iscsitgt01
46670       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
46680       Stack: corosync
46690       Current DC: iscsitgt01a.example.com (version 1.1.15-11.el7-e174ec8) - partition with quorum
46700       Last updated: Fri Nov 25 22:48:03 2016          Last change: Fri Nov 25 22:47:34 2016 by root via crm_resource on iscsitgt01a.example.com
46710
46720       2 nodes and 5 resources configured
46730
46740       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
46750
46760       Full list of resources:
46770
46780        Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
46790            Masters: [ iscsitgt01a.example.com ]
46800            Slaves: [ iscsitgt01s.example.com ]
46810        Resource Group: g_tgt
46820            p_lvm      (ocf::heartbeat:LVM):   Started iscsitgt01a.example.com
46830            p_lio      (ocf::heartbeat:LIO):   Started iscsitgt01a.example.com
46840            p_vip      (ocf::heartbeat:VIP):   Started iscsitgt01a.example.com
46850
46860       Daemon Status:
46870         corosync: active/disabled
46880         pacemaker: active/disabled
46890         pcsd: active/enabled
46900
46910   ○   Active 機で、設定変更を確認します。
46920
46930    a  diff <(grep -v last-lrm-refresh /etc/ha.d/crm.conf) <(sudo pcs config | grep -v last-lrm-refresh)
46940
46950   ○   Active 機と Stand-by 機で、状態を記録します。
46960
46970 a,s  sudo pcs status | sudo tee /etc/ha.d/crm.status
```

```
46980       Cluster name: iscsitgt01
46990       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
47000       Stack: corosync
47010       Current DC: iscsitgt01a.example.com (version 1.1.15-11.el7-e174ec8) - partition with quorum
47020       Last updated: Fri Nov 25 22:49:57 2016          Last change: Fri Nov 25 22:47:34 2016 by root via crm_resource on iscsitgt01a.example.com
47030
47040       2 nodes and 5 resources configured
47050
47060       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
47070
47080       Full list of resources:
47090
47100        Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
47110            Masters: [ iscsitgt01a.example.com ]
47120            Slaves: [ iscsitgt01s.example.com ]
47130        Resource Group: g_tgt
47140            p_lvm      (ocf::heartbeat:LVM):   Started iscsitgt01a.example.com
47150            p_lio      (ocf::heartbeat:LIO):   Started iscsitgt01a.example.com
47160            p_vip      (ocf::heartbeat:VIP):   Started iscsitgt01a.example.com
47170
47180       Daemon Status:
47190         corosync: active/disabled
47200         pacemaker: active/disabled
47210         pcsd: active/enabled
47220
47230 a,s    sudo cp -a /etc{,~}/ha.d/crm.status
47240
47250   ○    Active 機で、クラスタを停止します。
47260
47270    a   sudo pcs cluster stop --all
47280       10.110.88.57: Stopping Cluster (pacemaker)...
47290       10.110.88.58: Stopping Cluster (pacemaker)...
47300       10.110.88.58: Stopping Cluster (corosync)...
47310       10.110.88.57: Stopping Cluster (corosync)...
47320
47330   ○    Active 機と Stand-by 機で、再起動します。
47340
47350 a,s    sudo reboot
47360
47370   ○    Active 機と Stand-by 機へ、管理者用一般ユーザにて、ssh でログインします。
```

```
47380
47390   a   ssh admin@10.110.88.57
47400   a   admin@10.110.88.57's password: ********
47410
47420   s   ssh admin@10.110.88.58
47430   s   admin@10.110.88.58's password: ********
47440
47450   ○   Active 機で、クラスタを起動します。
47460
47470   a   sudo pcs cluster start --all
47480       10.110.88.57: Starting Cluster...
47490       10.110.88.58: Starting Cluster...
47500
47510   ○   Active 機で、状態を確認します。
47520
47530   a   sudo pcs status
47540       Cluster name: iscsitgt01
47550       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
47560       Stack: corosync
47570       Current DC: iscsitgt01s.example.com (version 1.1.15-11.el7-e174ec8) - partition with quorum
47580       Last updated: Fri Nov 25 23:06:32 2016          Last change: Fri Nov 25 23:06:30 2016 by root via crm_resource on iscsitgt01s.example.com
47590
47600       2 nodes and 5 resources configured
47610
47620       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
47630
47640       Full list of resources:
47650
47660        Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
47670            Masters: [ iscsitgt01a.example.com ]
47680            Slaves: [ iscsitgt01s.example.com ]
47690        Resource Group: g_tgt
47700            p_lvm      (ocf::heartbeat:LVM):   Started iscsitgt01a.example.com
47710            p_lio      (ocf::heartbeat:LIO):   Started iscsitgt01a.example.com
47720            p_vip      (ocf::heartbeat:VIP):   Started iscsitgt01a.example.com
47730
47740       Daemon Status:
47750         corosync: active/disabled
47760         pacemaker: active/disabled
47770         pcsd: active/enabled
```

47780

○ 【Munin のインストールと初期設定】

○ 以下のインストーラを DVD ドライブにセットします。

a, s
```
# V834394-01.iso (Oracle Linux 7.3)
```

○ インストーラをマウントします。

a, s
```
sudo mount /dev/cdrom /mnt
mount: /dev/sr0 is write-protected, mounting read-only
```

○ インターネットと接続可能な端末で以下のコマンドを実行する等して、必要なパッケージを収集します。

- `curl -O http://yum.oracle.com/repo/OracleLinux/OL7/optional/latest/x86_64/getPackage/perl-Crypt-DES-2.05-20.el7.x86_64.rpm`
- `curl -O http://yum.oracle.com/repo/OracleLinux/OL7/optional/latest/x86_64/getPackage/perl-File-Copy-Recursive-0.38-14.el7.noarch.rpm`
- `curl -O http://yum.oracle.com/repo/OracleLinux/OL7/optional/latest/x86_64/getPackage/perl-Taint-Runtime-0.03-19.el7.x86_64.rpm`
- `curl -O http://yum.oracle.com/repo/OracleLinux/OL7/optional/latest/x86_64/getPackage/perl-XML-DOM-1.44-19.el7.noarch.rpm`
- `curl -O http://yum.oracle.com/repo/OracleLinux/OL7/optional/latest/x86_64/getPackage/perl-XML-RegExp-0.04-2.el7.noarch.rpm`
- `curl -O http://yum.oracle.com/repo/OracleLinux/OL7/optional/latest/x86_64/getPackage/rrdtool-perl-1.4.8-9.el7.x86_64.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/m/munin-2.0.25-11.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/m/munin-common-2.0.25-11.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/m/munin-node-2.0.25-11.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-Cache-Cache-1.06-12.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-Email-Date-Format-1.002-15.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-HTML-Template-2.95-1.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-IO-Multiplex-1.13-6.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-IPC-ShareLite-0.17-12.el7.x86_64.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-Log-Dispatch-2.41-1.el7.1.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-Log-Dispatch-FileRotate-1.19-13.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-Log-Log4perl-1.42-2.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-MIME-Lite-3.030-1.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-MIME-Types-1.38-2.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-Mail-Sender-0.8.23-1.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-Mail-Sendmail-0.79-21.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-Net-CIDR-0.18-1.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-Net-SNMP-6.0.1-7.el7.noarch.rpm`
- `curl -O https://dl.fedoraproject.org/pub/epel/7/x86_64/p/perl-Net-Server-2.007-2.el7.noarch.rpm`

○ 収集したパッケージをホームディレクトリにコピーし、確認します。

```
48190 a,s    scp xxxx@yyy:drbd84-utils-8.9.6-1.el7.elrepo.x86_64.rpm .
48200 a,s    scp xxxx@yyy:perl-Crypt-DES-2.05-20.el7.x86_64.rpm .
48210 a,s    scp xxxx@yyy:perl-File-Copy-Recursive-0.38-14.el7.noarch.rpm .
48220 a,s    scp xxxx@yyy:perl-Taint-Runtime-0.03-19.el7.x86_64.rpm .
48230 a,s    scp xxxx@yyy:perl-XML-DOM-1.44-19.el7.noarch.rpm .
48240 a,s    scp xxxx@yyy:perl-XML-RegExp-0.04-2.el7.noarch.rpm .
48250 a,s    scp xxxx@yyy:rrdtool-perl-1.4.8-9.el7.x86_64.rpm .
48260 a,s    scp xxxx@yyy:munin-2.0.25-11.el7.noarch.rpm .
48270 a,s    scp xxxx@yyy:munin-common-2.0.25-11.el7.noarch.rpm .
48280 a,s    scp xxxx@yyy:munin-node-2.0.25-11.el7.noarch.rpm .
48290 a,s    scp xxxx@yyy:perl-Cache-Cache-1.06-12.el7.noarch.rpm .
48300 a,s    scp xxxx@yyy:perl-Email-Date-Format-1.002-15.el7.noarch.rpm .
48310 a,s    scp xxxx@yyy:perl-HTML-Template-2.95-1.el7.noarch.rpm .
48320 a,s    scp xxxx@yyy:perl-IO-Multiplex-1.13-6.el7.noarch.rpm .
48330 a,s    scp xxxx@yyy:perl-IPC-ShareLite-0.17-12.el7.x86_64.rpm .
48340 a,s    scp xxxx@yyy:perl-Log-Dispatch-2.41-1.el7.1.noarch.rpm .
48350 a,s    scp xxxx@yyy:perl-Log-Dispatch-FileRotate-1.19-13.el7.noarch.rpm .
48360 a,s    scp xxxx@yyy:perl-Log-Log4perl-1.42-2.el7.noarch.rpm .
48370 a,s    scp xxxx@yyy:perl-MIME-Lite-3.030-1.el7.noarch.rpm .
48380 a,s    scp xxxx@yyy:perl-MIME-Types-1.38-2.el7.noarch.rpm .
48390 a,s    scp xxxx@yyy:perl-Mail-Sender-0.8.23-1.el7.noarch.rpm .
48400 a,s    scp xxxx@yyy:perl-Mail-Sendmail-0.79-21.el7.noarch.rpm .
48410 a,s    scp xxxx@yyy:perl-Net-CIDR-0.18-1.el7.noarch.rpm .
48420 a,s    scp xxxx@yyy:perl-Net-SNMP-6.0.1-7.el7.noarch.rpm .
48430 a,s    scp xxxx@yyy:perl-Net-Server-2.007-2.el7.noarch.rpm .
48440
48450 a,s    ls -l *.rpm
48460        -rw-rw-r-- 1 admin admin 410308 Nov 25 16:10 drbd84-utils-8.9.6-1.el7.elrepo.x86_64.rpm
48470        -rw-rw-r-- 1 admin admin 204328 Nov 25 23:11 munin-2.0.25-11.el7.noarch.rpm
48480        -rw-rw-r-- 1 admin admin  93672 Nov 25 23:12 munin-common-2.0.25-11.el7.noarch.rpm
48490        -rw-rw-r-- 1 admin admin 408204 Nov 25 23:12 munin-node-2.0.25-11.el7.noarch.rpm
48500        -rw-rw-r-- 1 admin admin  93340 Nov 25 23:12 perl-Cache-Cache-1.06-12.el7.noarch.rpm
48510        -rw-rw-r-- 1 admin admin  19920 Nov 25 23:11 perl-Crypt-DES-2.05-20.el7.x86_64.rpm
48520        -rw-rw-r-- 1 admin admin  17524 Nov 25 23:12 perl-Email-Date-Format-1.002-15.el7.noarch.rpm
48530        -rw-rw-r-- 1 admin admin  23164 Nov 25 23:11 perl-File-Copy-Recursive-0.38-14.el7.noarch.rpm
48540        -rw-rw-r-- 1 admin admin  77780 Nov 25 23:12 perl-HTML-Template-2.95-1.el7.noarch.rpm
48550        -rw-rw-r-- 1 admin admin  25616 Nov 25 23:12 perl-IO-Multiplex-1.13-6.el7.noarch.rpm
48560        -rw-rw-r-- 1 admin admin  31004 Nov 25 23:12 perl-IPC-ShareLite-0.17-12.el7.x86_64.rpm
48570        -rw-rw-r-- 1 admin admin  84300 Nov 25 23:12 perl-Log-Dispatch-2.41-1.el7.1.noarch.rpm
48580        -rw-rw-r-- 1 admin admin  25232 Nov 25 23:12 perl-Log-Dispatch-FileRotate-1.19-13.el7.noarch.rpm
```

```
-rw-rw-r-- 1 admin admin 433560 Nov 25 23:12 perl-Log-Log4perl-1.42-2.el7.noarch.rpm
-rw-rw-r-- 1 admin admin  60212 Nov 25 23:12 perl-Mail-Sender-0.8.23-1.el7.noarch.rpm
-rw-rw-r-- 1 admin admin  29540 Nov 25 23:12 perl-Mail-Sendmail-0.79-21.el7.noarch.rpm
-rw-rw-r-- 1 admin admin  98316 Nov 25 23:12 perl-MIME-Lite-3.030-1.el7.noarch.rpm
-rw-rw-r-- 1 admin admin  39184 Nov 25 23:12 perl-MIME-Types-1.38-2.el7.noarch.rpm
-rw-rw-r-- 1 admin admin  19640 Nov 25 23:12 perl-Net-CIDR-0.18-1.el7.noarch.rpm
-rw-rw-r-- 1 admin admin 213136 Nov 25 23:12 perl-Net-Server-2.007-2.el7.noarch.rpm
-rw-rw-r-- 1 admin admin 105348 Nov 25 23:12 perl-Net-SNMP-6.0.1-7.el7.noarch.rpm
-rw-rw-r-- 1 admin admin  22496 Nov 25 23:11 perl-Taint-Runtime-0.03-19.el7.x86_64.rpm
-rw-rw-r-- 1 admin admin 141504 Nov 25 23:11 perl-XML-DOM-1.44-19.el7.noarch.rpm
-rw-rw-r-- 1 admin admin  10628 Nov 25 23:11 perl-XML-RegExp-0.04-2.el7.noarch.rpm
-rw-rw-r-- 1 admin admin  42864 Nov 25 23:11 rrdtool-perl-1.4.8-9.el7.x86_64.rpm

a,s    file *.rpm
drbd84-utils-8.9.6-1.el7.elrepo.x86_64.rpm:           RPM v3.0 bin i386/x86_64 drbd84-utils-8.9.6-1.el7.elrepo
munin-2.0.25-11.el7.noarch.rpm:                       RPM v3.0 bin noarch munin-2.0.25-11.el7
munin-common-2.0.25-11.el7.noarch.rpm:                RPM v3.0 bin noarch munin-common-2.0.25-11.el7
munin-node-2.0.25-11.el7.noarch.rpm:                  RPM v3.0 bin noarch munin-node-2.0.25-11.el7
perl-Cache-Cache-1.06-12.el7.noarch.rpm:              RPM v3.0 bin noarch perl-Cache-Cache-1.06-12.el7
perl-Crypt-DES-2.05-20.el7.x86_64.rpm:                RPM v3.0 bin i386/x86_64 perl-Crypt-DES-2.05-20.el7
perl-Email-Date-Format-1.002-15.el7.noarch.rpm:       RPM v3.0 bin noarch perl-Email-Date-Format-1.002-15.el7
perl-File-Copy-Recursive-0.38-14.el7.noarch.rpm:      RPM v3.0 bin noarch perl-File-Copy-Recursive-0.38-14.el7
perl-HTML-Template-2.95-1.el7.noarch.rpm:             RPM v3.0 bin noarch perl-HTML-Template-2.95-1.el7
perl-IO-Multiplex-1.13-6.el7.noarch.rpm:              RPM v3.0 bin noarch perl-IO-Multiplex-1.13-6.el7
perl-IPC-ShareLite-0.17-12.el7.x86_64.rpm:            RPM v3.0 bin i386/x86_64 perl-IPC-ShareLite-0.17-12.el7
perl-Log-Dispatch-2.41-1.el7.1.noarch.rpm:            RPM v3.0 bin noarch perl-Log-Dispatch-2.41-1.el7.1
perl-Log-Dispatch-FileRotate-1.19-13.el7.noarch.rpm:  RPM v3.0 bin noarch perl-Log-Dispatch-FileRotate-1.19-13.el7
perl-Log-Log4perl-1.42-2.el7.noarch.rpm:              RPM v3.0 bin noarch perl-Log-Log4perl-1.42-2.el7
perl-Mail-Sender-0.8.23-1.el7.noarch.rpm:             RPM v3.0 bin noarch perl-Mail-Sender-0.8.23-1.el7
perl-Mail-Sendmail-0.79-21.el7.noarch.rpm:            RPM v3.0 bin noarch perl-Mail-Sendmail-0.79-21.el7
perl-MIME-Lite-3.030-1.el7.noarch.rpm:                RPM v3.0 bin noarch perl-MIME-Lite-3.030-1.el7
perl-MIME-Types-1.38-2.el7.noarch.rpm:                RPM v3.0 bin noarch perl-MIME-Types-1.38-2.el7
perl-Net-CIDR-0.18-1.el7.noarch.rpm:                  RPM v3.0 bin noarch perl-Net-CIDR-0.18-1.el7
perl-Net-Server-2.007-2.el7.noarch.rpm:               RPM v3.0 bin noarch perl-Net-Server-2.007-2.el7
perl-Net-SNMP-6.0.1-7.el7.noarch.rpm:                 RPM v3.0 bin noarch perl-Net-SNMP-6.0.1-7.el7
perl-Taint-Runtime-0.03-19.el7.x86_64.rpm:            RPM v3.0 bin i386/x86_64 perl-Taint-Runtime-0.03-19.el7
perl-XML-DOM-1.44-19.el7.noarch.rpm:                  RPM v3.0 bin noarch perl-XML-DOM-1.44-19.el7
perl-XML-RegExp-0.04-2.el7.noarch.rpm:                RPM v3.0 bin noarch perl-XML-RegExp-0.04-2.el7
rrdtool-perl-1.4.8-9.el7.x86_64.rpm:                  RPM v3.0 bin i386/x86_64 rrdtool-perl-1.4.8-9.el7
```

48990 ○ Munin をインストールします。Oracle 社サポート外のパッケージです。
49000
49010 a, s `sudo yum -y --disablerepo=¥* --enablerepo=media install httpd`
49020 a, s `sudo yum -y --disablerepo=¥* --enablerepo=media localinstall perl-*.rpm rrdtool-perl-*.rpm munin-*.rpm`
49030
49040 ○ インストーラをアンマウントします。
49050
49060 a, s `sudo umount /mnt`
49070
49080 ○ インストーラをDVDドライブから外します。
49090
49100 a, s `# Eject DVD`
49110
49120 ○ 追加インストールしたパッケージの設定をバックアップします。
49130
49140 a, s `sudo cp -a /etc{,~}/cron.d/munin`
49150 a, s `sudo cp -a /etc{,~}/fonts`
49160 a, s `sudo cp -a /etc{,~}/httpd`
49170 a, s `sudo cp -a /etc{,~}/logrotate.d/httpd`
49180 a, s `sudo cp -a /etc{,~}/logrotate.d/munin`
49190 a, s `sudo cp -a /etc{,~}/logrotate.d/munin-node`
49200 a, s `sudo cp -a /etc{,~}/munin`
49210 a, s `sudo cp -a /etc{,~}/sysconfig/htcacheclean`
49220 a, s `sudo cp -a /etc{,~}/sysconfig/httpd`
49230 a, s `sudo cp -a /etc/passwd   /etc~/passwd_$(date +%Y%m%d_%H%M%S)`
49240 a, s `sudo cp -a /etc/passwd-  /etc~/passwd-_$(date +%Y%m%d_%H%M%S)`
49250 a, s `sudo cp -a /etc/shadow   /etc~/shadow_$(date +%Y%m%d_%H%M%S)`
49260 a, s `sudo cp -a /etc/shadow-  /etc~/shadow-_$(date +%Y%m%d_%H%M%S)`
49270 a, s `sudo cp -a /etc/group    /etc~/group_$(date +%Y%m%d_%H%M%S)`
49280 a, s `sudo cp -a /etc/group-   /etc~/group-_$(date +%Y%m%d_%H%M%S)`
49290 a, s `sudo cp -a /etc/gshadow  /etc~/gshadow_$(date +%Y%m%d_%H%M%S)`
49300 a, s `sudo cp -a /etc/gshadow- /etc~/gshadow-_$(date +%Y%m%d_%H%M%S)`
49310
49320 ○ DRBD, LIO に関するプラグインを作成します。
49330
49340 a, s `cat << 'EOF' | sudo tee /usr/share/munin/plugins/drbd`
49350 a, s `#!/usr/bin/perl`
49360 a, s `#%# family=auto`
49370 a, s `#%# capabilities=autoconf`
49380 a, s `# http://www.drbd.org/en/doc/users-guide-84/ch-admin#s-performance-indicators`

```
49390 a,s
49400 a,s   use strict;
49410 a,s   my $file="/proc/drbd";
49420 a,s   my $store = {};
49430 a,s   my $rid;
49440 a,s
49450 a,s   &crunch;
49460 a,s   &display;
49470 a,s
49480 a,s   sub display{
49490 a,s     if ($ARGV[0] and $ARGV[0] eq "config"){
49500 a,s       print "graph_title DRBD¥n";
49510 a,s       print "graph_category DRBD¥n";
49520 a,s       print "graph_info Graph DRBD¥n";
49530 a,s       print "graph_vlabel Graph DRBD (Bytes/sec)¥n";
49540 a,s       print "graph_scale yes¥n";
49550 a,s       print "graph_args --base 1024 --lower-limit 0¥n";
49560 a,s       print "graph_period second¥n";
49570 a,s       print "graph_height 200¥n";
49580 a,s       print "graph_width 400¥n";
49590 a,s       print "graph_printf %7.2lf¥n";
49600 a,s       foreach my $key ( keys %$store ){
49610 a,s         my $drbdname = 'drbd'.$key;
49620 a,s         print $drbdname."dr.label $drbdname Disk Read¥n";
49630 a,s         print $drbdname."dw.label $drbdname Disk Write¥n";
49640 a,s         print $drbdname."ns.label $drbdname Network Send¥n";
49650 a,s         print $drbdname."nr.label $drbdname Network Receive¥n";
49660 a,s         print $drbdname."os.label $drbdname Out of Sync¥n";
49670 a,s         print $drbdname."dr.cdef ".$drbdname."dr,1024,*¥n";
49680 a,s         print $drbdname."dw.cdef ".$drbdname."dw,1024,*¥n";
49690 a,s         print $drbdname."ns.cdef ".$drbdname."ns,1024,*¥n";
49700 a,s         print $drbdname."nr.cdef ".$drbdname."nr,1024,*¥n";
49710 a,s         print $drbdname."os.cdef ".$drbdname."os,1024,*¥n";
49720 a,s         print $drbdname."dr.min 0¥n";
49730 a,s         print $drbdname."dw.min 0¥n";
49740 a,s         print $drbdname."ns.min 0¥n";
49750 a,s         print $drbdname."nr.min 0¥n";
49760 a,s         print $drbdname."os.min 0¥n";
49770 a,s         print $drbdname."dr.type DERIVE¥n";
49780 a,s         print $drbdname."dw.type DERIVE¥n";
```

```
49790 a,s         print $drbdname."ns.type DERIVE¥n";
49800 a,s         print $drbdname."nr.type DERIVE¥n";
49810 a,s         print $drbdname."os.type DERIVE¥n";
49820 a,s       }
49830 a,s       exit 0;
49840 a,s     }
49850 a,s     foreach my $key ( keys %$store ){
49860 a,s       my $drbdname = 'drbd'.$key;
49870 a,s       print $drbdname."dw.value ".$store->{$key}->{'dw'}."¥n";
49880 a,s       print $drbdname."dr.value ".$store->{$key}->{'dr'}."¥n";
49890 a,s       print $drbdname."ns.value ".$store->{$key}->{'ns'}."¥n";
49900 a,s       print $drbdname."nr.value ".$store->{$key}->{'nr'}."¥n";
49910 a,s       print $drbdname."os.value ".$store->{$key}->{'os'}."¥n";
49920 a,s     }
49930 a,s   }
49940 a,s
49950 a,s   sub crunch{
49960 a,s     open (IN, $file) || die "Could not open $file for reading: $!";
49970 a,s     if ($ARGV[0] and $ARGV[0] eq "autoconf"){
49980 a,s       close (IN);
49990 a,s       print "yes¥n";
50000 a,s       exit 0;
50010 a,s     }
50020 a,s     while (<IN>){
50030 a,s       next if /version:|GIT-hash:/;
50040 a,s       chomp;
50050 a,s       my ($drbd) = $_ =~ /^¥s+(¥d):/;
50060 a,s       $rid = $drbd if $drbd =~ /¥d/;
50070 a,s       my ($ns) = $_ =~ /ns:(¥d*)/;  $store->{ $rid }->{'ns'} = $ns if $ns ne undef;
50080 a,s       my ($nr) = $_ =~ /nr:(¥d*)/;  $store->{ $rid }->{'nr'} = $nr if $ns ne undef;
50090 a,s       my ($dw) = $_ =~ /dw:(¥d*)/;  $store->{ $rid }->{'dw'} = $dw if $dw ne undef;
50100 a,s       my ($dr) = $_ =~ /dr:(¥d*)/;  $store->{ $rid }->{'dr'} = $dr if $dr ne undef;
50110 a,s       my ($os) = $_ =~ /oos:(¥d*)/; $store->{ $rid }->{'os'} = $os if $os ne undef;
50120 a,s     }
50130 a,s     close (IN);
50140 a,s   }
50150 a,s
50160 a,s   exit 0;
50170 a,s   EOF
50180 a,s   sudo chmod 755 /usr/share/munin/plugins/drbd
```

```
50190 a, s
50200 a, s    cat << 'EOF' | sudo tee /usr/share/munin/plugins/drbd_al
50210 a, s    #!/usr/bin/perl
50220 a, s    #%# family=auto
50230 a, s    #%# capabilities=autoconf
50240 a, s    # http://www.drbd.org/en/doc/users-guide-84/ch-admin#s-performance-indicators
50250 a, s
50260 a, s    use strict;
50270 a, s    my $file="/proc/drbd";
50280 a, s    my $store = {};
50290 a, s    my $rid;
50300 a, s
50310 a, s    &crunch;
50320 a, s    &display;
50330 a, s
50340 a, s    sub display{
50350 a, s      if ($ARGV[0] and $ARGV[0] eq "config"){
50360 a, s        print "graph_title DRBD (Activity Log)¥n";
50370 a, s        print "graph_category DRBD¥n";
50380 a, s        print "graph_info Graph DRBD (Activity Log)¥n";
50390 a, s        print "graph_vlabel Graph DRBD (Activity Log)¥n";
50400 a, s        print "graph_scale yes¥n";
50410 a, s        print "graph_args --base 1024 --lower-limit 0¥n";
50420 a, s        print "graph_period second¥n";
50430 a, s        print "graph_height 200¥n";
50440 a, s        print "graph_width 400¥n";
50450 a, s        print "graph_printf %7.2lf¥n";
50460 a, s        foreach my $key ( keys %$store ){
50470 a, s          my $drbdname = 'drbd'.$key;
50480 a, s          print $drbdname."al.label $drbdname Activity log¥n";
50490 a, s          print $drbdname."al.min 0¥n";
50500 a, s    #       print $drbdname."al.type DERIVE¥n";
50510 a, s        }
50520 a, s        exit 0;
50530 a, s      }
50540 a, s      foreach my $key ( keys %$store ){
50550 a, s        my $drbdname = 'drbd'.$key;
50560 a, s        print $drbdname."al.value ".$store->{$key}->{'al'}."¥n";
50570 a, s      }
50580 a, s    }
```

```
50590 a, s
50600 a, s    sub crunch{
50610 a, s      open (IN, $file ) || die "Could not open $file for reading: $!";
50620 a, s      if ($ARGV[0] and $ARGV[0] eq "autoconf"){
50630 a, s        close (IN);
50640 a, s        print "yes¥n";
50650 a, s        exit 0;
50660 a, s      }
50670 a, s      while (<IN>){
50680 a, s        next if /version:|GIT-hash:/;
50690 a, s        chomp;
50700 a, s        my ($drbd) = $_ =~ /^¥s+(¥d):/;
50710 a, s        $rid = $drbd if $drbd =~ /¥d/;
50720 a, s        my ($al) = $_ =~ /al:(¥d*)/; $store->{ $rid }->{'al'} = $al if $al ne undef;
50730 a, s      }
50740 a, s      close (IN);
50750 a, s    }
50760 a, s
50770 a, s    exit 0;
50780 a, s    EOF
50790 a, s    sudo chmod 755 /usr/share/munin/plugins/drbd_al
50800 a, s
50810 a, s    cat << 'EOF' | sudo tee /usr/share/munin/plugins/drbd_ext
50820 a, s    #!/usr/bin/perl
50830 a, s    #%# family=auto
50840 a, s    #%# capabilities=autoconf
50850 a, s    # http://www.drbd.org/en/doc/users-guide-84/ch-admin#s-performance-indicators
50860 a, s
50870 a, s    use strict;
50880 a, s    my $file="/proc/drbd";
50890 a, s    my $store = {};
50900 a, s    my $rid;
50910 a, s
50920 a, s    &crunch;
50930 a, s    &display;
50940 a, s
50950 a, s    sub display{
50960 a, s      if ($ARGV[0] and $ARGV[0] eq "config"){
50970 a, s        print "graph_title DRBD (Ext)¥n";
50980 a, s        print "graph_category DRBD¥n";
```

```
50990 a,s       print "graph_info Graph DRBD (Ext)¥n";
51000 a,s       print "graph_vlabel Graph DRBD (Ext)¥n";
51010 a,s       print "graph_scale yes¥n";
51020 a,s       print "graph_args --base 1024 --lower-limit 0¥n";
51030 a,s       print "graph_period second¥n";
51040 a,s       print "graph_height 200¥n";
51050 a,s       print "graph_width 400¥n";
51060 a,s       print "graph_printf %7.2lf¥n";
51070 a,s       foreach my $key ( keys %$store ){
51080 a,s         my $drbdname = 'drbd'.$key;
51090 a,s         print $drbdname."bm.label $drbdname Bit Map¥n";
51100 a,s         print $drbdname."lo.label $drbdname Local count¥n";
51110 a,s         print $drbdname."pe.label $drbdname Pending¥n";
51120 a,s         print $drbdname."ua.label $drbdname UnAcknowledged¥n";
51130 a,s         print $drbdname."ap.label $drbdname Application Pending¥n";
51140 a,s         print $drbdname."ep.label $drbdname Epochs¥n";
51150 a,s       }
51160 a,s       exit 0;
51170 a,s     }
51180 a,s     foreach my $key ( keys %$store ){
51190 a,s       my $drbdname = 'drbd'.$key;
51200 a,s       print $drbdname."bm.value ".$store->{$key}->{'bm'}."¥n";
51210 a,s       print $drbdname."lo.value ".$store->{$key}->{'lo'}."¥n";
51220 a,s       print $drbdname."pe.value ".$store->{$key}->{'pe'}."¥n";
51230 a,s       print $drbdname."ua.value ".$store->{$key}->{'ua'}."¥n";
51240 a,s       print $drbdname."ap.value ".$store->{$key}->{'ap'}."¥n";
51250 a,s       print $drbdname."ep.value ".$store->{$key}->{'ep'}."¥n";
51260 a,s     }
51270 a,s   }
51280 a,s
51290 a,s   sub crunch{
51300 a,s     open (IN, $file ) || die "Could not open $file for reading: $!";
51310 a,s     if ($ARGV[0] and $ARGV[0] eq "autoconf"){
51320 a,s       close (IN);
51330 a,s       print "yes¥n";
51340 a,s       exit 0;
51350 a,s     }
51360 a,s     while (<IN>){
51370 a,s       next if /version:|GIT-hash:/;
51380 a,s       chomp;
```

```
51390 a,s       my ($drbd) = $_ =~ /^¥s+(¥d):/;
51400 a,s       $rid = $drbd if $drbd =~ /¥d/;
51410 a,s       my ($bm) = $_ =~ /bm:(¥d*)/; $store->{ $rid }->{'bm'} = $bm if $bm ne undef;
51420 a,s       my ($lo) = $_ =~ /lo:(¥d*)/; $store->{ $rid }->{'lo'} = $lo if $lo ne undef;
51430 a,s       my ($pe) = $_ =~ /pe:(¥d*)/; $store->{ $rid }->{'pe'} = $pe if $pe ne undef;
51440 a,s       my ($ua) = $_ =~ /ua:(¥d*)/; $store->{ $rid }->{'ua'} = $ua if $ua ne undef;
51450 a,s       my ($ap) = $_ =~ /ap:(¥d*)/; $store->{ $rid }->{'ap'} = $ap if $ap ne undef;
51460 a,s       my ($ep) = $_ =~ /ep:(¥d*)/; $store->{ $rid }->{'ep'} = $ep if $ep ne undef;
51470 a,s     }
51480 a,s     close (IN);
51490 a,s   }
51500 a,s
51510 a,s   exit 0;
51520 a,s   EOF
51530 a,s   sudo chmod 755 /usr/share/munin/plugins/drbd_ext
51540 a,s
51550 a,s   cat << 'EOF' | sudo tee /usr/share/munin/plugins/lio_read
51560 a,s   #!/bin/sh
51570 a,s   #%# family=auto
51580 a,s   #%# capabilities=autoconf
51590 a,s
51600 a,s   if [ "$1" = "autoconf" ]; then
51610 a,s     if [ -d /sys/kernel/config/target/iscsi/iqn.*/tpgt_1 ]; then
51620 a,s       echo yes
51630 a,s     else
51640 a,s       echo 'no (no iscsi target)'
51650 a,s     fi
51660 a,s     exit 0
51670 a,s   fi
51680 a,s   if [ "$1" = "config" ]; then
51690 a,s     echo 'graph_title LIO (Read)'
51700 a,s     echo 'graph_category LIO'
51710 a,s     echo 'graph_info Graph LIO (Read)'
51720 a,s     echo 'graph_vlabel Graph LIO (Bytes/sec)'
51730 a,s     echo 'graph_scale yes'
51740 a,s     echo 'graph_args --base 1024 --lower-limit 0'
51750 a,s     echo 'graph_period second'
51760 a,s   #  echo 'graph_height 200'
51770 a,s   #  echo 'graph_width 400'
51780 a,s     echo 'graph_printf %7.2lf'
```

```
51790 a,s
51800 a,s     TGT_=
51810 a,s     INI_=
51820 a,s     for i in $(echo /sys/kernel/config/target/iscsi/iqn.*/tpgt_1/acls/iqn.*/*/statistics/scsi_auth_intr/read_mbytes | LANG=C sort)
51830 a,s     do
51840 a,s       TGT=$(echo $i | cut -d/ -f7)
51850 a,s       INI=$(echo $i | cut -d/ -f10)
51860 a,s       LUN=$(echo $i | cut -d/ -f11)
51870 a,s       if [ "$TGT_" = "$TGT" ]; then
51880 a,s         if [ "$INI_" = "$INI" ]; then
51890 a,s           :
51900 a,s         else
51910 a,s           INI_=$INI
51920 a,s           INI_F=$(echo $INI | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
51930 a,s         fi
51940 a,s       else
51950 a,s          TGT_=$TGT
51960 a,s          TGT_F=$(echo $TGT | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
51970 a,s          INI_=$INI
51980 a,s          INI_F=$(echo $INI | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
51990 a,s          for j in $(echo /sys/kernel/config/target/iscsi/$TGT/tpgt_1/lun/*/statistics/scsi_tgt_port/read_mbytes | LANG=C sort)
52000 a,s          do
52010 a,s            LUN_=$(echo $j | cut -d/ -f10)
52020 a,s            echo ${TGT_F}$LUN_.label $(echo $TGT | cut -d: -f2) ¥($LUN_¥) Read
52030 a,s            echo ${TGT_F}$LUN_.cdef ${TGT_F}$LUN_,1048576,¥*
52040 a,s            echo ${TGT_F}$LUN_.min 0
52050 a,s            echo ${TGT_F}$LUN_.type DERIVE
52060 a,s          done
52070 a,s       fi
52080 a,s       echo ${TGT_F}${INI_F}$LUN.label $(echo $TGT | cut -d: -f2) - $(echo $INI | cut -d: -f2) ¥($LUN¥) Read
52090 a,s       echo ${TGT_F}${INI_F}$LUN.cdef ${TGT_F}${INI_F}$LUN,1048576,¥*
52100 a,s       echo ${TGT_F}${INI_F}$LUN.min 0
52110 a,s       echo ${TGT_F}${INI_F}$LUN.type DERIVE
52120 a,s     done
52130 a,s     exit 0
52140 a,s   fi
52150 a,s
52160 a,s   TGT_=
52170 a,s   INI_=
52180 a,s   for i in $(echo /sys/kernel/config/target/iscsi/iqn.*/tpgt_1/acls/iqn.*/*/statistics/scsi_auth_intr/read_mbytes | LANG=C sort)
```

```
52190 a,s   do
52200 a,s     TGT=$(echo $i | cut -d/ -f7)
52210 a,s     INI=$(echo $i | cut -d/ -f10)
52220 a,s     LUN=$(echo $i | cut -d/ -f11)
52230 a,s     if [ "$TGT_" = "$TGT" ]; then
52240 a,s       if [ "$INI_" = "$INI" ]; then
52250 a,s         :
52260 a,s       else
52270 a,s         INI_=$INI
52280 a,s         INI_F=$(echo $INI | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
52290 a,s       fi
52300 a,s     else
52310 a,s        TGT_=$TGT
52320 a,s        TGT_F=$(echo $TGT | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
52330 a,s        INI_=$INI
52340 a,s        INI_F=$(echo $INI | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
52350 a,s        for j in $(echo /sys/kernel/config/target/iscsi/$TGT/tpgt_1/lun/*/statistics/scsi_tgt_port/read_mbytes | LANG=C sort)
52360 a,s        do
52370 a,s          LUN_=$(echo $j | cut -d/ -f10)
52380 a,s          echo -n "${TGT_F}$LUN_.value "
52390 a,s          cat $j
52400 a,s        done
52410 a,s     fi
52420 a,s     echo -n "${TGT_F}${INI_F}$LUN.value "
52430 a,s     cat $i
52440 a,s   done
52450 a,s
52460 a,s   exit 0;
52470 a,s   EOF
52480 a,s   sudo chmod 755 /usr/share/munin/plugins/lio_read
52490 a,s
52500 a,s   cat << 'EOF' | sudo tee /usr/share/munin/plugins/lio_write
52510 a,s   #!/bin/sh
52520 a,s   #%# family=auto
52530 a,s   #%# capabilities=autoconf
52540 a,s
52550 a,s   if [ "$1" = "autoconf" ]; then
52560 a,s     if [ -d /sys/kernel/config/target/iscsi/iqn.*/tpgt_1 ]; then
52570 a,s       echo yes
52580 a,s     else
```

```
52590 a,s       echo 'no (no iscsi target)'
52600 a,s     fi
52610 a,s     exit 0
52620 a,s   fi
52630 a,s   if [ "$1" = "config" ]; then
52640 a,s     echo 'graph_title LIO (Write)'
52650 a,s     echo 'graph_category LIO'
52660 a,s     echo 'graph_info Graph LIO (Write)'
52670 a,s     echo 'graph_vlabel Graph LIO (Bytes/sec)'
52680 a,s     echo 'graph_scale yes'
52690 a,s     echo 'graph_args --base 1024 --lower-limit 0'
52700 a,s     echo 'graph_period second'
52710 a,s   #  echo 'graph_height 200'
52720 a,s   #  echo 'graph_width 400'
52730 a,s     echo 'graph_printf %7.2lf'
52740 a,s
52750 a,s     TGT_=
52760 a,s     INI_=
52770 a,s     for i in $(echo /sys/kernel/config/target/iscsi/iqn.*/tpgt_1/acls/iqn.*/*/statistics/scsi_auth_intr/write_mbytes | LANG=C sort)
52780 a,s     do
52790 a,s       TGT=$(echo $i | cut -d/ -f7)
52800 a,s       INI=$(echo $i | cut -d/ -f10)
52810 a,s       LUN=$(echo $i | cut -d/ -f11)
52820 a,s       if [ "$TGT_" = "$TGT" ]; then
52830 a,s         if [ "$INI_" = "$INI" ]; then
52840 a,s           :
52850 a,s         else
52860 a,s           INI_=$INI
52870 a,s           INI_F=$(echo $INI | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
52880 a,s         fi
52890 a,s       else
52900 a,s          TGT_=$TGT
52910 a,s          TGT_F=$(echo $TGT | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
52920 a,s          INI_=$INI
52930 a,s          INI_F=$(echo $INI | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
52940 a,s          for j in $(echo /sys/kernel/config/target/iscsi/$TGT/tpgt_1/lun/*/statistics/scsi_tgt_port/write_mbytes | LANG=C sort)
52950 a,s          do
52960 a,s            LUN_=$(echo $j | cut -d/ -f10)
52970 a,s            echo ${TGT_F}$LUN_.label $(echo $TGT | cut -d: -f2) ¥($LUN_¥) Write
52980 a,s            echo ${TGT_F}$LUN_.cdef ${TGT_F}$LUN_,1048576,¥*
```

```
52990 a,s             echo ${TGT_F}$LUN_.min 0
53000 a,s             echo ${TGT_F}$LUN_.type DERIVE
53010 a,s           done
53020 a,s       fi
53030 a,s       echo ${TGT_F}${INI_F}$LUN.label $(echo $TGT | cut -d: -f2) - $(echo $INI | cut -d: -f2) ¥($LUN¥) Write
53040 a,s       echo ${TGT_F}${INI_F}$LUN.cdef ${TGT_F}${INI_F}$LUN,1048576,¥*
53050 a,s       echo ${TGT_F}${INI_F}$LUN.min 0
53060 a,s       echo ${TGT_F}${INI_F}$LUN.type DERIVE
53070 a,s     done
53080 a,s     exit 0
53090 a,s   fi
53100 a,s
53110 a,s   TGT_=
53120 a,s   INI_=
53130 a,s   for i in $(echo /sys/kernel/config/target/iscsi/iqn.*/tpgt_1/acls/iqn.*/*/statistics/scsi_auth_intr/write_mbytes | LANG=C sort)
53140 a,s   do
53150 a,s     TGT=$(echo $i | cut -d/ -f7)
53160 a,s     INI=$(echo $i | cut -d/ -f10)
53170 a,s     LUN=$(echo $i | cut -d/ -f11)
53180 a,s     if [ "$TGT_" = "$TGT" ]; then
53190 a,s       if [ "$INI_" = "$INI" ]; then
53200 a,s         :
53210 a,s       else
53220 a,s         INI_=$INI
53230 a,s         INI_F=$(echo $INI | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
53240 a,s       fi
53250 a,s     else
53260 a,s        TGT_=$TGT
53270 a,s        TGT_F=$(echo $TGT | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
53280 a,s        INI_=$INI
53290 a,s        INI_F=$(echo $INI | tr "[:upper:]" "[:lower:]" | sed -e 's/-/_/g' -e 's![^a-z0-9_]!!g')
53300 a,s        for j in $(echo /sys/kernel/config/target/iscsi/$TGT/tpgt_1/lun/*/statistics/scsi_tgt_port/write_mbytes | LANG=C sort)
53310 a,s        do
53320 a,s          LUN_=$(echo $j | cut -d/ -f10)
53330 a,s          echo -n "${TGT_F}$LUN_.value "
53340 a,s          cat $j
53350 a,s        done
53360 a,s     fi
53370 a,s     echo -n "${TGT_F}${INI_F}$LUN.value "
53380 a,s     cat $i
```

```
53390 a,s    done
53400 a,s
53410 a,s    exit 0;
53420 a,s    EOF
53430 a,s    sudo chmod 755 /usr/share/munin/plugins/lio_write
53440 a,s
53450   ○    有効化されている不要なプラグインを無効化します。
53460
53470 a,s    sudo rm /etc/munin/plugins/postfix_mail*
53480 a,s    sudo rm /etc/munin/plugins/fw_packets
53490
53500   ○    Munin の稼働状況をグラフ化するプラグインを有効化します。
53510
53520 a,s    cat << 'EOF' | sudo tee -a /etc/munin/plugin-conf.d/munin-node
53530 a,s
53540 a,s    [munin_*]
53550 a,s    user munin
53560 a,s    EOF
53570 a,s    cat << 'EOF' | sudo tee -a /etc/munin/plugin-conf.d/munin-node
53580 a,s
53590 a,s    [http_loadtime]
53600 a,s    env.target http://127.0.0.1/server-status
53610 a,s    env.requisites true
53620 a,s    EOF
53630 a,s    cat << 'EOF' | sudo tee /etc/httpd/conf.d/status.conf
53640 a,s    <IfModule mod_status.c>
53650 a,s        ExtendedStatus On
53660 a,s        <Location /server-status>
53670 a,s            SetHandler server-status
53680 a,s            Order deny,allow
53690 a,s            Deny from all
53700 a,s            Allow from 127.0.0.1
53710 a,s        </Location>
53720 a,s    </IfModule>
53730 a,s    EOF
53740 a,s    sudo ln -s '/usr/share/munin/plugins/apache_accesses' '/etc/munin/plugins/apache_accesses'
53750 a,s    sudo ln -s '/usr/share/munin/plugins/apache_processes' '/etc/munin/plugins/apache_processes'
53760 a,s    sudo ln -s '/usr/share/munin/plugins/apache_volume' '/etc/munin/plugins/apache_volume'
53770 a,s    sudo ln -s '/usr/share/munin/plugins/http_loadtime' '/etc/munin/plugins/http_loadtime'
53780 a,s    sudo ln -s '/usr/share/munin/plugins/munin_stats' '/etc/munin/plugins/munin_stats'
```

```
53790 a,s    sudo ln -s '/usr/share/munin/plugins/munin_update' '/etc/munin/plugins/munin_update'
53800
53810   ○    DRBD の稼働状況をグラフ化するプラグインを有効化します。
53820
53830 a,s    sudo ln -s '/usr/share/munin/plugins/drbd' '/etc/munin/plugins/drbd'
53840 a,s    sudo ln -s '/usr/share/munin/plugins/drbd_al' '/etc/munin/plugins/drbd_al'
53850 a,s    sudo ln -s '/usr/share/munin/plugins/drbd_ext' '/etc/munin/plugins/drbd_ext'
53860
53870   ○    Munin にホスト名を登録します。
53880
53890 a,s    sudo sed -i -e "s/^host_name .*¥$/host_name $(uname -n)/" /etc/munin/munin-node.conf
53900 a,s    sudo sed -i -e "s/^¥¥[localhost/[$(uname -n)/" /etc/munin/munin.conf
53910
53920   ○    PrivateTmp 機能を無効化します。
53930
53940 a,s    sudo sed -i -e 's/^PrivateTmp=.*$/PrivateTmp=false/' /usr/lib/systemd/system/munin-node.service
53950 a,s    sudo systemctl daemon-reload
53960
53970   ○    ベーシック認証設定を行います。
53980
53990 a,s    sudo htpasswd -c -b /etc/munin/munin-htpasswd munin 'password'
54000 a,s    sudo htpasswd -b /etc/munin/munin-htpasswd admin 'password'
54010 a,s    sudo htpasswd -b /etc/munin/munin-htpasswd monitor 'password'
54020
54030   ○    LIO の稼働状況をグラフ化するプラグインを有効化します。
54040
54050 a,s    sudo ln -s '/usr/share/munin/plugins/lio_read' '/etc/munin/plugins/lio_read'
54060 a,s    sudo ln -s '/usr/share/munin/plugins/lio_write' '/etc/munin/plugins/lio_write'
54070
54080   ○    Active 機で、Munin 関連サービスを自動起動するように変更し、起動します。
54090
54100    a   sudo systemctl enable munin-node.service
54110    a   sudo systemctl enable httpd.service
54120    a   sudo systemctl start munin-node.service
54130    a   sudo systemctl start httpd.service
54140
54150   ○    数十分待ってから、ブラウザでアクセスし、動作を確認します。
54160
54170    a   # http://10.110.88.57/munin
54180
```

○ リソースをスイッチオーバします。

```
a  sudo pcs resource move g_tgt; sleep 5; sudo pcs resource clear g_tgt
```

○ Stand-by 機で、Munin 関連サービスを自動起動するように変更し、起動します。

```
s  sudo systemctl enable munin-node.service
s  sudo systemctl enable httpd.service
s  sudo systemctl start munin-node.service
s  sudo systemctl start httpd.service
```

○ 数十分待ってから、ブラウザでアクセスし、動作を確認します。

```
s  # http://10.110.88.58/munin
```

○ リソースをスイッチバックします。

```
a  sudo pcs resource move g_tgt; sleep 5; sudo pcs resource clear g_tgt
```

○ LIO の統計情報を定期保存する設定を行います。

```
a,s  sudo mkdir -p /etc/lio
a,s  sudo mkdir -p /var/log/lio/
a,s
a,s  cat << 'EOF' | sudo tee /etc/lio/save
a,s  #!/bin/sh
a,s  FILE=/dev/shm/lio-$(date +%Y%m%d%H%M)
a,s  for i in $(find /sys/kernel/config/target ! -type d | LANG=C sort)
a,s   do echo [$i]; cat $i; echo; done > $FILE 2> /dev/null
a,s  gzip $FILE
a,s  mv $FILE.gz /var/log/lio/
a,s  EOF
a,s  sudo chmod 755 /etc/lio/save
a,s
a,s  cat << 'EOF' | sudo tee /etc/lio/statistics
a,s  #!/bin/sh
a,s  FILE=/dev/shm/lio-statistics-$(date +%Y%m%d%H%M)
a,s  YYYYMMDD=$(echo $FILE | sed -e 's/^.*¥([0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]¥)[0-9][0-9][0-9][0-9]$/¥1/')
a,s  for i in $(for k in /sys/kernel/config/target/{core/*/*/,iscsi/*/{fabric_,tpgt_1/{acls/*/{fabric_,*/},lun/*/}}}statistics; do echo $k; done | LANG=C sort)
a,s   do for j in $(find $i ! -type d | LANG=C sort); do echo [$j]; cat $j; echo; done; done > $FILE 2> /dev/null
```

```
54590 a,s    gzip $FILE
54600 a,s    mkdir -p /var/log/lio/$YYYYMMDD/
54610 a,s    mv $FILE.gz /var/log/lio/$YYYYMMDD/
54620 a,s    EOF
54630 a,s    sudo chmod 755 /etc/lio/statistics
54640 a,s
54650 a,s    cat << 'EOF' | sudo tee /etc/cron.d/lio
54660 a,s    59 * * * * root nice -n 19 /etc/lio/save
54670 a,s    * * * * * root nice -n 19 /etc/lio/statistics
54680 a,s    58 23 * * * root nice -n 19 /bin/find /var/log/lio -mtime +365 -print0 | xargs -0 rm -rfv 2> /dev/null
54690 a,s    EOF
```

当文書で紹介した構成で初期構築をご希望の方は、メール(mailto: si@pc-office.net)にてお問い合わせください。
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