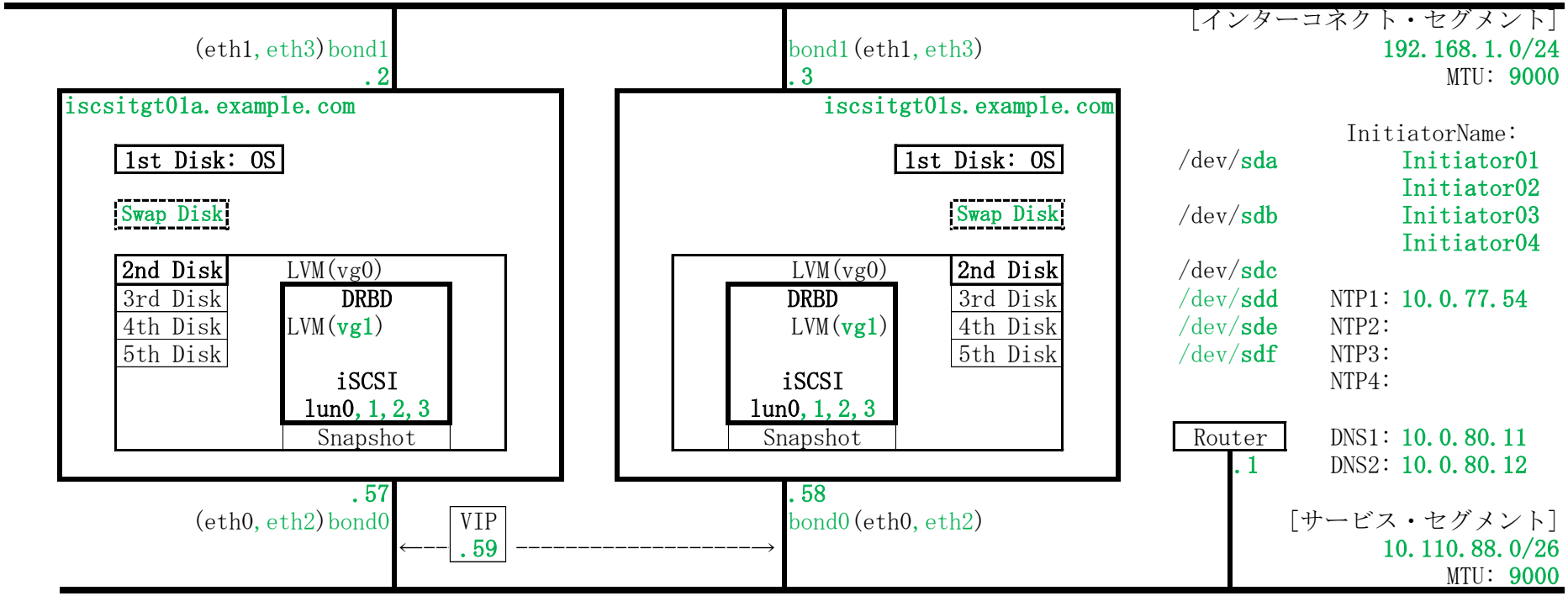
[Check]

Ver.1.00 2016/11/15

【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
DVD ドライブ: 1台
HDD 1: 8GB 以上 (1st Disk, OS 用)
HDD 2: 1GB 以上 (swap 用)
HDD 3: 1GB 以上 (2nd Disk, データ用)
HDD 4: 1GB 以上 (3rd Disk, データ用)
HDD 5: 1GB 以上 (4th Disk, データ用)
HDD 6: 1GB 以上 (5th Disk, データ用)
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/**sdc1**　　LVM 物理ボリューム
○　/dev/**sdd1**　　LVM 物理ボリューム
○　/dev/**sde1**　　LVM 物理ボリューム
○　/dev/**sdf1**　　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
○　/dev/**vg1**/lv-lun0　　DRBD 上の LVM 論理ボリューム (lun0 としてエクスポート)
○　/dev/**vg1**/lv-lun1　　DRBD 上の LVM 論理ボリューム (lun1 としてエクスポート)
○　/dev/**vg1**/lv-lun2　　DRBD 上の LVM 論理ボリューム (lun2 としてエクスポート)
○　/dev/**vg1**/lv-lun3　　DRBD 上の LVM 論理ボリューム (lun3 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: 17.2 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 (2048-33554431, default 2048): [Enter]
1250        Using default value 2048
1260 a,s    Last sector, +sectors or +size{K,M,G} (2048-33554431, default 33554431): +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 (1026048-33554431, default 1026048): [Enter]
1400        Using default value 1026048
1410 a,s    Last sector, +sectors or +size{K,M,G} (1026048-33554431, default 33554431): [Enter]
1420        Using default value 33554431
1430        Partition 2 of type Linux and of size 15.5 GiB is set
1440
1450 a,s    Command (m for help): p
1460
1470        Disk /dev/sda: 17.2 GB, 17179869184 bytes, 33554432 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    33554431    16264192   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    33554431    16264192   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: 17.2 GB, 17179869184 bytes, 33554432 sectors
2190        Disk /dev/sdb: 107.4 GB, 107374182400 bytes, 209715200 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            inet6 ::1/128 scope host
2800               valid_lft forever preferred_lft forever
2810        2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen 1000
2820            link/ether 00:0c:29:0b:ab:ce brd ff:ff:ff:ff:ff:ff
2830        3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen 1000
2840            link/ether 00:0c:29:0b:ab:b0 brd ff:ff:ff:ff:ff:ff
2850        4: eth2: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen 1000
2860            link/ether 00:0c:29:0b:ab:ba brd ff:ff:ff:ff:ff:ff
2870        5: eth3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen 1000
2880            link/ether 00:0c:29:0b:ab:c4 brd ff:ff:ff:ff:ff:ff
2890
2900   ○    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。
2910
2920            ※  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。
2930
2940   ○    IP アドレスを一時的に設定します。
2950
2960    a   ip addr add 10.110.88.57/26 dev eth0
2970
2980    s   ip addr add 10.110.88.58/26 dev eth0
2990
3000            ※  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。
3010
3020   ○    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。
3030
3040        ip route add default via 10.110.88.1
3050
3060   ○    root にて、ssh でログインします。
3070
```

```
3080    a   ssh root@10.110.88.57
3090        The authenticity of host '10.110.88.57 (10.110.88.57)' can't be established.
3100        ECDSA key fingerprint is 95:bc:49:71:b2:a3:dd:ab:63:ad:35:e4:fe:4d:fc:82.
3110    a   Are you sure you want to continue connecting (yes/no)? yes
3120        Warning: Permanently added '10.110.88.57' (ECDSA) to the list of known hosts.
3130    a   root@10.110.88.57's password: ********
3140        Last login: Sat Oct 29 18:33:24 2016
3150
3160    s   ssh root@10.110.88.58
3170        The authenticity of host '10.110.88.58 (10.110.88.58)' can't be established.
3180        ECDSA key fingerprint is 8f:f6:81:0f:44:e1:83:d5:0a:9d:3f:90:7c:3e:93:73.
3190    s   Are you sure you want to continue connecting (yes/no)? yes
3200        Warning: Permanently added '10.110.88.58' (ECDSA) to the list of known hosts.
3210    s   root@10.110.88.58's password: ********
3220        Last login: Sat Oct 29 18:33:24 2016
3230
3240  ○     ストレージの情報を確認します。
3250
3260 a,s    fdisk -l | grep /dev/ | sort
3270        /dev/sda1   *        2048     1026047      512000   83  Linux
3280        /dev/sda2         1026048    33554431    16264192   83  Linux
3290        /dev/sdb1            2048     2097151     1047552   82  Linux swap / Solaris
3300        Disk /dev/sda: 17.2 GB, 17179869184 bytes, 33554432 sectors
3310        Disk /dev/sdb: 1073 MB, 1073741824 bytes, 2097152 sectors
3320        Disk /dev/sdc: 107.4 GB, 107374182400 bytes, 209715200 sectors
3330        Disk /dev/sdd: 107.4 GB, 107374182400 bytes, 209715200 sectors
3340        Disk /dev/sde: 107.4 GB, 107374182400 bytes, 209715200 sectors
3350        Disk /dev/sdf: 107.4 GB, 107374182400 bytes, 209715200 sectors
3360
3370 a,s    blkid
3380        /dev/sda1: LABEL="/boot" UUID="0d524bba-e554-4e4c-8594-4293131808af" TYPE="xfs"
3390        /dev/sda2: LABEL="/" UUID="7fe16a0a-7b75-4e49-bef7-3b01194313fc" TYPE="xfs"
3400        /dev/sdb1: LABEL="swap" UUID="9d2b758f-05a3-4aa2-b19a-23684a062a65" TYPE="swap"
3410
3420 a,s    cat /etc/fstab
3430        #
3440        # /etc/fstab
3450        # Created by anaconda on Sat Oct 29 18:33:24 2016
3460        #
3470        # Accessible filesystems, by reference, are maintained under '/dev/disk'
```

```
3480        # See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info
3490        #
3500        UUID=7fe16a0a-7b75-4e49-bef7-3b01194313fc /                       xfs     defaults        0 0
3510        UUID=0d524bba-e554-4e4c-8594-4293131808af /boot                   xfs     defaults        0 0
3520        UUID=9d2b758f-05a3-4aa2-b19a-23684a062a65 swap                    swap    defaults        0 0
3530
```

3540 ○ キーボード、ロケールの情報を確認します。

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

3690 ○ タイムゾーンの情報を確認します。

```
3700
3710 a,s    cat /etc/adjtime
3720        0.0 0 0.0
3730           0
3740        UTC
3750
3760 a,s    hwclock --debug
3770        hwclock from util-linux 2.23.2
3780        Using /dev interface to clock.
3790        Last drift adjustment done at 0 seconds after 1969
3800        Last calibration done at 0 seconds after 1969
3810        Hardware clock is on UTC time
3820        Assuming hardware clock is kept in UTC time.
3830        Waiting for clock tick...
3840        ...got clock tick
3850        Time read from Hardware Clock: 2016/10/29 09:33:24
3860        Hw clock time : 2016/10/29 09:33:24 = 1478911709 seconds since 1969
3870        Sat 29 Oct 2016 18:33:24 AM JST  -0.520512 seconds
```

```
3880
3890 a,s    ls -l /etc/localtime
3900        lrwxrwxrwx 1 root root 32 Oct 29 18:33 /etc/localtime -> ../usr/share/zoneinfo/Asia/Tokyo
3910
3920 a,s    timedatectl status
3930              Local time: Sat 2016-10-29 18:33:24 JST
3940          Universal time: Sat 2016-10-29 09:33:24 UTC
3950                RTC time: Sat 2016-10-29 09:33:24
3960               Time zone: Asia/Tokyo (JST, +0900)
3970             NTP enabled: n/a
3980        NTP synchronized: no
3990         RTC in local TZ: no
4000              DST active: n/a
4010
4020   ○    SELinux を無効化します。
4030
4040 a,s    sed -i -e 's/^SELINUX=.*$/SELINUX=disabled/' /etc/sysconfig/selinux
4050
4060            ※  カーネルパラメータで無効化していますが、運用上紛らわしいので設定ファイルも変更します。
4070
4080   ○    管理者用一般ユーザを作成します。
4090
4100 a,s    sed -i -e 's/^CREATE_MAIL_SPOOL=.*$/CREATE_MAIL_SPOOL=no/' /etc/default/useradd
4110
4120 a,s    groupadd -g 1000 admin
4130 a,s    useradd -g admin -G wheel -u 1000 admin
4140 a,s    echo 'password' | passwd --stdin admin
4150        Changing password for user admin.
4160        passwd: all authentication tokens updated successfully.
4170
4180 a,s    id admin
4190        uid=1000(admin) gid=1000(admin) groups=1000(admin),10(wheel)
4200
4210   ○    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。
4220
4230 a,s    echo '%wheel ALL=(ALL) NOPASSWD: ALL' > /etc/sudoers.d/wheel
4240
4250   ○    管理者用一般ユーザにて、ssh でログインします。
4260
4270    a   ssh admin@10.110.88.57
```

```
4280    a   admin@10.110.88.57's password: ********
4290
4300    s   ssh admin@10.110.88.58
4310    s   admin@10.110.88.58's password: ********
4320
4330    ○   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。
4340
4350 a,s    sudo sed -i -e '/^#auth.*required.*pam_wheel.so use_uid$/ s/#//' /etc/pam.d/su
4360 a,s    echo "SU_WHEEL_ONLY yes" | sudo tee -a /etc/login.defs
4370
4380    ○   root アカウントでのパスワード認証による ssh 接続を禁止します。
4390
4400 a,s    sudo sed -i -e 's/^#PermitRootLogin .*$/PermitRootLogin without-password/' /etc/ssh/sshd_config
4410 a,s    sudo systemctl restart sshd
4420
4430    ○   参照・監視用一般ユーザを作成します。
4440
4450 a,s    sudo groupadd -g 1001 monitor
4460 a,s    sudo useradd -g monitor -u 1001 monitor
4470 a,s    echo 'password' | sudo passwd --stdin monitor
4480        Changing password for user monitor.
4490        passwd: all authentication tokens updated successfully.
4500
4510 a,s    id monitor
4520        uid=1001(monitor) gid=1001(monitor) groups=1001(monitor)
4530
4540    ○   NIC のデバイス名をバス情報に基づいて固定します。
4550
4560 a,s    sudo cp /dev/null /etc/udev/rules.d/70-persistent-net.rules
4570 a,s    NUM=0
4580 a,s    while :
4590 a,s    do
4600 a,s      ip addr show eth$NUM > /dev/null 2>&1 || break
4610 a,s      BUS=$(ethtool -i eth$NUM | grep bus-info | awk '{print $2}')
4620 a,s      cat << EOF | sudo tee -a /etc/udev/rules.d/70-persistent-net.rules
4630 a,s    SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*", KERNELS=="$BUS", ATTR{type}=="1", NAME="eth$NUM"
4640 a,s    EOF
4650 a,s      NUM=$((NUM+1))
4660 a,s    done
4670        SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*", KERNELS=="0000:04:00.0", ATTR{type}=="1", NAME="eth0"
```

```
4680        SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*", KERNELS=="0000:0b:00.0", ATTR{type}=="1", NAME="eth1"
4690        SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*", KERNELS=="0000:13:00.0", ATTR{type}=="1", NAME="eth2"
4700        SUBSYSTEM=="net", ACTION=="add", DRIVERS=="?*", KERNELS=="0000:1b:00.0", ATTR{type}=="1", NAME="eth3"
4710
4720            ※  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。
4730            ※  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。
4740
4750    ○   OS 起動時のカーネルパラメータを変更します。
4760
4770 a, s   sudo sed -i -e '/^GRUB_CMDLINE_LINUX=/ s/ *biosdevname=[^ "]*//' /etc/default/grub
4780 a, s   sudo sed -i -e '/^GRUB_CMDLINE_LINUX=/ s/ *net¥.ifnames=[^ "]*//' /etc/default/grub
4790 a, s   sudo sed -i -e '/^GRUB_CMDLINE_LINUX=/ s/rhgb quiet/ipv6.disable=1/' /etc/default/grub
4800 a, s   sudo grub2-mkconfig -o /boot/grub2/grub.cfg
4810        Generating grub configuration file ...
4820        Found linux image: /boot/vmlinuz-4.1.12-61.1.18.el7uek.x86_64
4830        Found initrd image: /boot/initramfs-4.1.12-61.1.18.el7uek.x86_64.img
4840        Found linux image: /boot/vmlinuz-3.10.0-514.el7.x86_64
4850        Found initrd image: /boot/initramfs-3.10.0-514.el7.x86_64.img
4860        Found linux image: /boot/vmlinuz-0-rescue-4305b3f1881f49358c6f848704b93e32
4870        Found initrd image: /boot/initramfs-0-rescue-4305b3f1881f49358c6f848704b93e32.img
4880        done
4890
4900        ※  「net.ifnames=0」「biosdevname=0」があると、前項の udev 設定が機能しません。
4910        ※  IPv6 を無効化しています。
4920
4930    ○   NIC を設定します。
4940
4950 a, s   BOND0_UUID=$(uuidgen)
4960 a, s   BOND0_BONDING_OPTS="resend_igmp=1 updelay=0 use_carrier=1 miimon=100 downdelay=0 xmit_hash_policy=0"
4970 a, s   BOND0_BONDING_OPTS="$BOND0_BONDING_OPTS primary_reselect=0 fail_over_mac=0 arp_validate=0"
4980 a, s   BOND0_BONDING_OPTS="$BOND0_BONDING_OPTS mode=active-backup primary=eth0"              ※  LAGの場合は「mode=802.3ad」
4990 a, s   BOND0_BONDING_OPTS="$BOND0_BONDING_OPTS lacp_rate=0 arp_interval=0 ad_select=0"
5000 a, s
5010 a, s   BOND1_UUID=$(uuidgen)
5020 a, s   BOND1_BONDING_OPTS="resend_igmp=1 updelay=0 use_carrier=1 miimon=100 downdelay=0 xmit_hash_policy=0"
5030 a, s   BOND1_BONDING_OPTS="$BOND1_BONDING_OPTS primary_reselect=0 fail_over_mac=0 arp_validate=0"
5040 a, s   BOND1_BONDING_OPTS="$BOND1_BONDING_OPTS mode=active-backup primary=eth1"              ※  LAGの場合は「mode=802.3ad」
5050 a, s   BOND1_BONDING_OPTS="$BOND1_BONDING_OPTS lacp_rate=0 arp_interval=0 ad_select=0"
5060 a, s
5070 a, s   cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-bond0
```

```
5080 a, s    DEVICE=bond0
5090 a, s    NAME=bond0
5100 a, s    TYPE=Bond
5110 a, s    UUID=$BOND0_UUID
5120 a, s    BONDING_OPTS="$BOND0_BONDING_OPTS"
5130 a, s    BONDING_MASTER=yes
5140 a, s    ONBOOT=yes
5150 a, s    BOOTPROTO=none
5160 a, s    DEFROUTE=yes
5170 a, s    PEERDNS=no
5180 a, s    PEERROUTES=no
5190 a, s    IPV4_FAILURE_FATAL=yes
5200 a, s    IPV6INIT=no
5210 a, s    IPV6_AUTOCONF=no
5220 a, s    IPV6_DEFROUTE=no
5230 a, s    IPV6_PEERDNS=no
5240 a, s    IPV6_PEERROUTES=no
5250 a, s    IPV6_FAILURE_FATAL=no
5260 a, s    EOF
5270 a, s
5280 a, s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-bond1
5290 a, s    DEVICE=bond1
5300 a, s    NAME=bond1
5310 a, s    TYPE=Bond
5320 a, s    UUID=$BOND1_UUID
5330 a, s    BONDING_OPTS="$BOND1_BONDING_OPTS"
5340 a, s    BONDING_MASTER=yes
5350 a, s    ONBOOT=yes
5360 a, s    BOOTPROTO=none
5370 a, s    DEFROUTE=no
5380 a, s    PEERDNS=no
5390 a, s    PEERROUTES=no
5400 a, s    IPV4_FAILURE_FATAL=yes
5410 a, s    IPV6INIT=no
5420 a, s    IPV6_AUTOCONF=no
5430 a, s    IPV6_DEFROUTE=no
5440 a, s    IPV6_PEERDNS=no
5450 a, s    IPV6_PEERROUTES=no
5460 a, s    IPV6_FAILURE_FATAL=no
5470 a, s    EOF
```

```
5480 a,s
5490 a,s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-eth0
5500 a,s    DEVICE=eth0
5510 a,s    NAME=eth0
5520 a,s    TYPE=Ethernet
5530 a,s    UUID=$(uuidgen)
5540 a,s    MASTER=$BOND0_UUID
5550 a,s    SLAVE=yes
5560 a,s    ONBOOT=yes
5570 a,s    MTU=9000
5580 a,s    EOF
5590 a,s
5600 a,s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-eth2
5610 a,s    DEVICE=eth2
5620 a,s    NAME=eth2
5630 a,s    TYPE=Ethernet
5640 a,s    UUID=$(uuidgen)
5650 a,s    MASTER=$BOND0_UUID
5660 a,s    SLAVE=yes
5670 a,s    ONBOOT=yes
5680 a,s    MTU=9000
5690 a,s    EOF
5700 a,s
5710 a,s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-eth1
5720 a,s    DEVICE=eth1
5730 a,s    NAME=eth1
5740 a,s    TYPE=Ethernet
5750 a,s    UUID=$(uuidgen)
5760 a,s    MASTER=$BOND1_UUID
5770 a,s    SLAVE=yes
5780 a,s    ONBOOT=yes
5790 a,s    MTU=9000
5800 a,s    EOF
5810 a,s
5820 a,s    cat << EOF | sudo tee /etc/sysconfig/network-scripts/ifcfg-eth3
5830 a,s    DEVICE=eth3
5840 a,s    NAME=eth3
5850 a,s    TYPE=Ethernet
5860 a,s    UUID=$(uuidgen)
5870 a,s    MASTER=$BOND1_UUID
```

```
5880 a,s    SLAVE=yes
5890 a,s    ONBOOT=yes
5900 a,s    MTU=9000
5910 a,s    EOF
5920 a,s
5930    a   # for Active
5940    a   cat << EOF | sudo tee -a /etc/sysconfig/network-scripts/ifcfg-bond0
5950    a   IPADDR=10.110.88.57
5960    a   PREFIX=26
5970    a   GATEWAY=10.110.88.1
5980    a   DNS1=10.0.80.11
5990    a   DNS2=10.0.80.12
6000    a   DOMAIN=example.com
6010    a   MTU=9000
6020    a   EOF
6030    a
6040    a   cat << EOF | sudo tee -a /etc/sysconfig/network-scripts/ifcfg-bond1
6050    a   IPADDR=192.168.1.2
6060    a   PREFIX=24
6070    a   MTU=9000
6080    a   EOF
6090    a
6100    s   # for Stand-by
6110    s   cat << EOF | sudo tee -a /etc/sysconfig/network-scripts/ifcfg-bond0
6120    s   IPADDR=10.110.88.58
6130    s   PREFIX=26
6140    s   GATEWAY=10.110.88.1
6150    s   DNS1=10.0.80.11
6160    s   DNS2=10.0.80.12
6170    s   DOMAIN=example.com
6180    s   MTU=9000
6190    s   EOF
6200    s
6210    s   cat << EOF | sudo tee -a /etc/sysconfig/network-scripts/ifcfg-bond1
6220    s   IPADDR=192.168.1.3
6230    s   PREFIX=24
6240    s   MTU=9000
6250    s   EOF
6260
6270    ○   NIC オフロード機能を無効化します。
```

```
6280
6290 a,s    cat << 'EOF' | sudo tee /etc/NetworkManager/dispatcher.d/00-ethertool
6300 a,s    #!/bin/sh
6310 a,s    if [ "$2" == "up" ]; then
6320 a,s      if [ "${1:0:3}" == "eth" ]; then
6330 a,s        ethtool -K $1 ¥
6340 a,s          rx off ¥
6350 a,s          tx off ¥
6360 a,s          sg off ¥
6370 a,s          tso off ¥
6380 a,s          ufo off ¥
6390 a,s          gso off ¥
6400 a,s          gro off ¥
6410 a,s          lro off ¥
6420 a,s          rxvlan off ¥
6430 a,s          txvlan off ¥
6440 a,s          ntuple off ¥
6450 a,s          rxhash off ¥
6460 a,s          highdma off ¥
6470 a,s          rx-vlan-filter off ¥
6480 a,s          tx-gso-robust off ¥
6490 a,s          tx-fcoe-segmentation off ¥
6500 a,s          fcoe-mtu off ¥
6510 a,s          tx-nocache-copy off ¥
6520 a,s          loopback off ¥
6530 a,s          rx-fcs off ¥
6540 a,s          rx-all off
6550 a,s        #ethtool -K $1 vlan-challenged off tx-lockless off netns-local off
6560 a,s        ethtool -G $1 rx 4096 tx 4096 rx-jumbo 2048
6570 a,s      fi
6580 a,s    fi
6590 a,s    EOF
6600 a,s    sudo chmod 755 /etc/NetworkManager/dispatcher.d/00-ethertool
6610
6620            ※  「VMXNET 3」でのみ動作確認しました。
6630            ※  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。
6640
6650  ○   hosts を設定します。
6660
6670 a,s    cat << 'EOF' | sudo tee /etc/hosts
```

```
6680 a,s    127.0.0.1       localhost localhost.localdomain localhost4 localhost4.localdomain4
6690 a,s    ::1             localhost localhost.localdomain localhost6 localhost6.localdomain6
6700 a,s    10.110.88.57    iscsitgt01a.example.com iscsitgt01a
6710 a,s    10.110.88.58    iscsitgt01s.example.com iscsitgt01s
6720 a,s    10.110.88.59    iscsitgt01.example.com iscsitgt01
6730 a,s    192.168.1.2     iscsitgt01a-ic.example.com iscsitgt01a-ic
6740 a,s    192.168.1.3     iscsitgt01s-ic.example.com iscsitgt01s-ic
6750 a,s    EOF
6760
6770   ○    hostname を設定します。
6780
6790    a   sudo hostnamectl set-hostname iscsitgt01a.example.com
6800
6810    s   sudo hostnamectl set-hostname iscsitgt01s.example.com
6820
6830   ○    yum リポジトリを設定します。
6840
6850 a,s    cat << 'EOF' | sudo tee /etc/yum.repos.d/media.repo
6860 a,s    [media]
6870 a,s    name=media
6880 a,s    baseurl=file:///mnt
6890 a,s    gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-oracle
6900 a,s    gpgcheck=1
6910 a,s    enabled=0
6920 a,s
6930 a,s    [media-mysql]
6940 a,s    name=media-mysql
6950 a,s    baseurl=file:///mnt/addons/Mysql
6960 a,s    gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-oracle
6970 a,s    gpgcheck=1
6980 a,s    enabled=0
6990 a,s
7000 a,s    [media-ha]
7010 a,s    name=media-ha
7020 a,s    baseurl=file:///mnt/addons/HighAvailability
7030 a,s    gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-oracle
7040 a,s    gpgcheck=1
7050 a,s    enabled=0
7060 a,s
7070 a,s    [media-rs]
```

```
7080 a,s    name=media-rs
7090 a,s    baseurl=file:///mnt/addons/ResilientStorage
7100 a,s    gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-oracle
7110 a,s    gpgcheck=1
7120 a,s    enabled=0
7130 a,s    EOF
7140
7150            ※  インストール・メディアを利用可能にします。
7160
7170 a,s    sudo sed -i -e 's/^/#/' /etc/yum.repos.d/public-yum-ol7.repo
7180
7190            ※  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。
7200
7210    ○   以下のインストーラを DVD ドライブにセットします。
7220
7230 a,s    # V834394-01.iso (Oracle Linux 7.3)
7240
7250    ○   インストーラをマウントします。
7260
7270 a,s    sudo mount /dev/cdrom /mnt
7280        mount: /dev/sr0 is write-protected, mounting read-only
7290
7300    ○   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。
7310
7320 a,s    sudo yum -y --disablerepo=¥* --enablerepo=media,media-mysql install ¥
7330 a,s     @development ¥
7340 a,s     @base ¥
7350 a,s     OpenIPMI ¥
7360 a,s     aide ¥
7370 a,s     dos2unix ¥
7380 a,s     dropwatch ¥
7390 a,s     dstat ¥
7400 a,s     expect ¥
7410 a,s     filebench ¥
7420 a,s     freeipmi-bmc-watchdog ¥
7430 a,s     freeipmi-ipmidetectd ¥
7440 a,s     ftp ¥
7450 a,s     haproxy ¥
7460 a,s     hdparm ¥
7470 a,s     iotop ¥
```

```
7480 a, s     ipmitool ¥
7490 a, s     iptables-services ¥
7500 a, s     iptraf-ng ¥
7510 a, s     iptstate ¥
7520 a, s     ipvsadm ¥
7530 a, s     iscsi-initiator-utils ¥
7540 a, s     keepalived ¥
7550 a, s     kernel-uek-devel ¥
7560 a, s     latrace ¥
7570 a, s     lftp ¥
7580 a, s     logwatch ¥
7590 a, s     lrzsz ¥
7600 a, s     ltrace ¥
7610 a, s     nmap ¥
7620 a, s     openssl-devel ¥
7630 a, s     oprofile ¥
7640 a, s     pax ¥
7650 a, s     perf ¥
7660 a, s     prelink ¥
7670 a, s     screen ¥
7680 a, s     sg3_utils ¥
7690 a, s     snapper ¥
7700 a, s     telnet ¥
7710 a, s     tmpwatch ¥
7720 a, s     trace-cmd ¥
7730 a, s     tree ¥
7740 a, s     x86info
7750
7760   ○    インストーラをアンマウントします。
7770
7780 a, s    sudo umount /mnt
7790
7800   ○    インストーラをDVDドライブから取り外します。
7810
7820 a, s    # Eject DVD
7830
7840   ○    NTP を設定します。
7850
7860 a, s    cat << 'EOF' | sudo tee /etc/chrony.conf
7870 a, s    server 10.0.77.54 iburst
```

```
7880 a, s    # server ***.***.***.*** iburst
7890 a, s    # server ***.***.***.*** iburst
7900 a, s    # server ***.***.***.*** iburst
7910 a, s    EOF
7920 a, s    # sudo sed -i -e '/^#/d' /etc/chrony.conf
7930 a, s
7940 a, s    cat << 'EOF' | sudo tee -a /etc/chrony.conf
7950 a, s
7960 a, s    # Use public servers from the pool.ntp.org project.
7970 a, s    # Please consider joining the pool (http://www.pool.ntp.org/join.html).
7980 a, s
7990 a, s    # Ignore stratum in source selection.
8000 a, s    stratumweight 0
8010 a, s
8020 a, s    # Record the rate at which the system clock gains/losses time.
8030 a, s    driftfile /var/lib/chrony/drift
8040 a, s
8050 a, s    # Enable kernel RTC synchronization.
8060 a, s    rtcsync
8070 a, s
8080 a, s    # In first three updates step the system clock instead of slew
8090 a, s    # if the adjustment is larger than 10 seconds.
8100 a, s    makestep 10 3
8110 a, s
8120 a, s    # Allow NTP client access from local network.
8130 a, s    #allow 192.168/16
8140 a, s
8150 a, s    # Listen for commands only on localhost.
8160 a, s    bindcmdaddress 127.0.0.1
8170 a, s    #bindcmdaddress ::1
8180 a, s
8190 a, s    # Serve time even if not synchronized to any NTP server.
8200 a, s    #local stratum 10
8210 a, s
8220 a, s    keyfile /etc/chrony.keys
8230 a, s
8240 a, s    # Specify the key used as password for chronyc.
8250 a, s    commandkey 1
8260 a, s
8270 a, s    # Generate command key if missing.
```

```
8280 a,s    generatecommandkey
8290 a,s
8300 a,s    # Disable logging of client accesses.
8310 a,s    noclientlog
8320 a,s
8330 a,s    # Send a message to syslog if a clock adjustment is larger than 0.5 seconds.
8340 a,s    logchange 0.5
8350 a,s
8360 a,s    logdir /var/log/chrony
8370 a,s    #log measurements statistics tracking
8380 a,s    EOF
8390 a,s
8400 a,s    cat << 'EOF' | sudo tee /etc/sysconfig/chronyd
8410 a,s    OPTIONS="-4"
8420 a,s    EOF
8430
```

8440 ○ 不要なサービスを無効化します。

```
8450
8460 a,s    sudo systemctl disable dmraid-activation.service
8470 a,s    sudo systemctl disable firewalld.service
8480 a,s    sudo systemctl disable mdmonitor.service
8490 a,s    sudo systemctl disable postfix.service
8500
```

8510 ※ 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。

```
8520
```

8530 ○ 必要なサービスを有効化します。

```
8540
8550 a,s    sudo systemctl enable psacct.service
8560
```

8570 ○ 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。

```
8580
8590 a,s    sudo systemctl disable iscsi.service
8600        Removed symlink /etc/systemd/system/sysinit.target.wants/iscsi.service.
8610
8620 a,s    sudo systemctl disable iscsid.socket
8630        Removed symlink /etc/systemd/system/sockets.target.wants/iscsid.socket.
8640
8650 a,s    sudo systemctl disable iscsiuio.socket
8660        Removed symlink /etc/systemd/system/sockets.target.wants/iscsiuio.socket.
8670
```

○ 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。

a, s
```
sudo sed -i -e 's/^#AddressFamily .*$/AddressFamily inet/' /etc/ssh/sshd_config
```
a, s
```
sudo sed -i -e 's/^inet_interfaces .*$/inet_interfaces = 127.0.0.1/' /etc/postfix/main.cf
```

a, s
```
sudo sed -i -e 's/^udp6/#udp6/' -e 's/^tcp6/#tcp6/' /etc/netconfig
```

○ 再起動します。

a, s
```
sudo reboot
```

○ 管理者用一般ユーザにて、ssh でログインします。

a
```
ssh admin@10.110.88.57
```
a
```
admin@10.110.88.57's password: ********
```

s
```
ssh admin@10.110.88.58
```
s
```
admin@10.110.88.58's password: ********
```

○ カーネル起動パラメータを確認します。

a, s
```
cat /proc/cmdline
```
```
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
```

※ 「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。

○ kdump の設定を確認します。

a, s
```
systemctl is-enabled kdump.service
```
```
enabled
```

a, s
```
sudo kdumpctl status
```
```
Kdump is operational
```

○ SELinux の設定を確認します。

a, s
```
grep -v ^# /etc/sysconfig/selinux
```
```
SELINUX=disabled
SELINUXTYPE=targeted
```

```
9080 a,s    getenforce
9090        Disabled
9100
9110    ○   ネットワーク設定を確認します。
9120
9130 a,s    ip addr show
9140        1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN
9150            link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
9160            inet 127.0.0.1/8 scope host lo
9170        2: eth0: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 9000 qdisc mq master bond0 state UP qlen 1000
9180            link/ether 00:0c:29:0b:ab:c4 brd ff:ff:ff:ff:ff:ff
9190        3: eth1: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 9000 qdisc mq master bond1 state UP qlen 1000
9200            link/ether 00:0c:29:0b:ab:ce brd ff:ff:ff:ff:ff:ff
9210        4: eth2: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 9000 qdisc mq master bond0 state UP qlen 1000
9220            link/ether 00:0c:29:0b:ab:c4 brd ff:ff:ff:ff:ff:ff
9230        5: eth3: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 9000 qdisc mq master bond1 state UP qlen 1000
9240            link/ether 00:0c:29:0b:ab:ce brd ff:ff:ff:ff:ff:ff
9250        6: bond0: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 9000 qdisc noqueue state UNKNOWN
9260            link/ether 00:0c:29:0b:ab:c4 brd ff:ff:ff:ff:ff:ff
9270            inet 10.110.88.57/26 brd 10.110.88.63 scope global bond0
9280        7: bond1: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 9000 qdisc noqueue state UNKNOWN
9290            link/ether 00:0c:29:0b:ab:ce brd ff:ff:ff:ff:ff:ff
9300            inet 192.168.1.2/24 brd 192.168.0.255 scope global bond1
9310
9320            ※  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。
9330
9340 a,s    cat /proc/net/bonding/bond0
9350        Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)
9360
9370        Bonding Mode: fault-tolerance (active-backup)
9380        Primary Slave: eth0 (primary_reselect always)
9390        Currently Active Slave: eth0
9400        MII Status: up
9410        MII Polling Interval (ms): 100
9420        Up Delay (ms): 0
9430        Down Delay (ms): 0
9440
9450        Slave Interface: eth0
9460        MII Status: up
9470        Speed: 10000 Mbps
```

```
9480        Duplex: full
9490        Link Failure Count: 0
9500        Permanent HW addr: 00:0c:29:0b:ab:b0
9510        Slave queue ID: 0
9520
9530        Slave Interface: eth2
9540        MII Status: up
9550        Speed: 10000 Mbps
9560        Duplex: full
9570        Link Failure Count: 0
9580        Permanent HW addr: 00:0c:29:0b:ab:c4
9590        Slave queue ID: 0
9600
9610 a,s    cat /proc/net/bonding/bond1
9620        Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)
9630
9640        Bonding Mode: fault-tolerance (active-backup)
9650        Primary Slave: eth1 (primary_reselect always)
9660        Currently Active Slave: eth1
9670        MII Status: up
9680        MII Polling Interval (ms): 100
9690        Up Delay (ms): 0
9700        Down Delay (ms): 0
9710
9720        Slave Interface: eth1
9730        MII Status: up
9740        Speed: 10000 Mbps
9750        Duplex: full
9760        Link Failure Count: 0
9770        Permanent HW addr: 00:0c:29:0b:ab:ba
9780        Slave queue ID: 0
9790
9800        Slave Interface: eth3
9810        MII Status: up
9820        Speed: 10000 Mbps
9830        Duplex: full
9840        Link Failure Count: 0
9850        Permanent HW addr: 00:0c:29:0b:ab:ce
9860        Slave queue ID: 0
9870
```

※ 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。

※ LAG 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
```

```
10280                 port number: 1
10290                 port state: 205
10300             details partner lacp pdu:
10310                 system priority: 65535
10320                 oper key: 1
10330                 port priority: 255
10340                 port number: 1
10350                 port state: 3
10360
10370             Slave Interface: eth3
10380             MII Status: up
10390             Speed: 10000 Mbps
10400             Duplex: full
10410             Link Failure Count: 0
10420             Permanent HW addr: 00:0c:29:8b:ff:fc
10430             Slave queue ID: 0
10440             Aggregator ID: 2
10450             Actor Churn State: churned
10460             Partner Churn State: churned
10470             Actor Churned Count: 1
10480             Partner Churned Count: 1
10490             details actor lacp pdu:
10500                 system priority: 0
10510                 port key: 13
10520                 port priority: 255
10530                 port number: 2
10540                 port state: 197
10550             details partner lacp pdu:
10560                 system priority: 65535
10570                 oper key: 1
10580                 port priority: 255
10590                 port number: 1
10600                 port state: 3
10610
10620   a   ip route show
10630       default via 10.110.88.1 dev bond0  proto static  metric 300
10640       10.110.88.0/26 dev bond0  proto kernel  scope link  src 10.110.88.57  metric 300
10650       192.168.1.0/24 dev bond1  proto kernel  scope link  src 192.168.0.2  metric 300
10660
10670   s   ip route show
```

```
10680         default via 10.110.88.1 dev bond0  proto static  metric 300
10690         10.110.88.0/26 dev bond0  proto kernel  scope link  src 10.110.88.58  metric 300
10700         192.168.1.0/24 dev bond1  proto kernel  scope link  src 192.168.0.3  metric 300
10710
10720 a,s     cat /etc/resolv.conf
10730         # Generated by NetworkManager
10740         search example.com
10750         nameserver 10.0.80.11
10760         nameserver 10.0.80.12
10770
10780   ○     hostname 設定を確認します。
10790
10800    a    hostnamectl status
10810           Static hostname: iscsitgt01a.example.com
10820                 Icon name: computer-vm
10830                   Chassis: vm
10840                Machine ID: d7806eba789047baa165a57149c83843
10850                   Boot ID: b5b36a3403dd403aad4656d2f7f9e7aa
10860            Virtualization: vmware
10870          Operating System: Oracle Linux Server 7.3
10880               CPE OS Name: cpe:/o:oracle:linux:7:2:server
10890                    Kernel: Linux 4.1.12-61.1.18.el7uek.x86_64
10900              Architecture: x86-64
10910
10920    s    hostnamectl status
10930           Static hostname: iscsitgt01s.example.com
10940                 Icon name: computer-vm
10950                   Chassis: vm
10960                Machine ID: b325c1c5d682439a91a65f7cfc317b20
10970                   Boot ID: a419d4d1ef00452f93da10a227365aca
10980            Virtualization: vmware
10990          Operating System: Oracle Linux Server 7.3
11000               CPE OS Name: cpe:/o:oracle:linux:7:2:server
11010                    Kernel: Linux 4.1.12-61.1.18.el7uek.x86_64
11020              Architecture: x86-64
11030
11040   ○     NIC のオフロード設定を確認します。
11050
11060 a,s     ethtool -k eth0
11070         Features for eth0:
```

```
11080       rx-checksumming: off
11090       tx-checksumming: off
11100               tx-checksum-ipv4: off [fixed]
11110               tx-checksum-ip-generic: off
11120               tx-checksum-ipv6: off [fixed]
11130               tx-checksum-fcoe-crc: off [fixed]
11140               tx-checksum-sctp: off [fixed]
11150       scatter-gather: off
11160               tx-scatter-gather: off
11170               tx-scatter-gather-fraglist: off [fixed]
11180       tcp-segmentation-offload: off
11190               tx-tcp-segmentation: off
11200               tx-tcp-ecn-segmentation: off [fixed]
11210               tx-tcp6-segmentation: off
11220       udp-fragmentation-offload: off [fixed]
11230       generic-segmentation-offload: off
11240       generic-receive-offload: off
11250       large-receive-offload: off
11260       rx-vlan-offload: off
11270       tx-vlan-offload: off
11280       ntuple-filters: off [fixed]
11290       receive-hashing: off
11300       highdma: off
11310       rx-vlan-filter: on [fixed]
11320       vlan-challenged: off [fixed]
11330       tx-lockless: off [fixed]
11340       netns-local: off [fixed]
11350       tx-gso-robust: off [fixed]
11360       tx-fcoe-segmentation: off [fixed]
11370       tx-gre-segmentation: off [fixed]
11380       tx-ipip-segmentation: off [fixed]
11390       tx-sit-segmentation: off [fixed]
11400       tx-udp_tnl-segmentation: off [fixed]
11410       fcoe-mtu: off [fixed]
11420       tx-nocache-copy: off
11430       loopback: off [fixed]
11440       rx-fcs: off [fixed]
11450       rx-all: off [fixed]
11460       tx-vlan-stag-hw-insert: off [fixed]
11470       rx-vlan-stag-hw-parse: off [fixed]
```

```
11480         rx-vlan-stag-filter: off [fixed]
11490         l2-fwd-offload: off [fixed]
11500         busy-poll: off [fixed]
11510         hw-switch-offload: off [fixed]
11520
11530 a,s     ethtool -k eth1
11540 a,s     ethtool -k eth2
11550 a,s     ethtool -k eth3
11560
11570 a,s     ethtool -g eth0
11580         Ring parameters for eth0:
11590         Pre-set maximums:
11600         RX:             4096
11610         RX Mini:        0
11620         RX Jumbo:       2048
11630         TX:             4096
11640         Current hardware settings:
11650         RX:             4032
11660         RX Mini:        0
11670         RX Jumbo:       2048
11680         TX:             4096
11690
11700             ※  搭載メモリサイズに応じて結果が異なります。
11710
11720 a,s     ethtool -g eth1
11730 a,s     ethtool -g eth2
11740 a,s     ethtool -g eth3
11750
11760   ○     NTP の状態を確認します。
11770
11780 a,s     systemctl status chronyd.service -l
11790         ● chronyd.service - NTP client/server
11800           Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enabled; vendor preset: enabled)
11810           Active: active (running) since Tue 2016-10-29 18:33:24 JST; 42min left
11820          Process: 601 ExecStartPost=/usr/libexec/chrony-helper update-daemon (code=exited, status=0/SUCCESS)
11830          Process: 576 ExecStart=/usr/sbin/chronyd $OPTIONS (code=exited, status=0/SUCCESS)
11840         Main PID: 583 (chronyd)
11850           CGroup: /system.slice/chronyd.service
11860                   └583 /usr/sbin/chronyd -4
11870
```

```
11880       Oct 29 18:33:24 iscsitgt01a.example.com systemd[1]: Starting NTP client/server...
11890       Oct 29 18:33:24 iscsitgt01a.example.com chronyd[584]: chronyd version 2.1.1 starting (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +DEBUG +ASYNCDNS +IPV6 +SECHASH)
11900       Oct 29 18:33:24 iscsitgt01a.example.com chronyd[584]: Generated key 1
11910       Oct 29 18:33:24 iscsitgt01a.example.com systemd[1]: Started NTP client/server.
11920       Oct 29 18:33:24 iscsitgt01a.example.com chronyd[584]: Selected source 10.0.77.54
11930
11940 a,s   chronyc sources
11950       210 Number of sources = 1
11960       MS Name/IP address         Stratum Poll Reach LastRx Last sample
11970       ===============================================================================
11980       ^* 10.0.77.54                    1   10   377   217   -177us[ -161us] +/- 4360us
11990
12000 a,s   timedatectl status
12010             Local time: Sat 2016-10-29 18:33:24 JST
12020       Universal time: Sat 2016-10-29 09:33:24 UTC
12030             RTC time: Sat 2016-10-29 09:33:24
12040            Time zone: Asia/Tokyo (JST, +0900)
12050          NTP enabled: yes
12060      NTP synchronized: yes
12070       RTC in local TZ: no
12080            DST active: n/a
12090
12100   ○   自動起動するサービスを確認します。
12110
12120 a,s   systemctl list-unit-files | grep enabled | LANG=C sort
12130       NetworkManager-dispatcher.service           enabled
12140       NetworkManager.service                      enabled
12150       abrt-ccpp.service                           enabled
12160       abrt-oops.service                           enabled
12170       abrt-vmcore.service                         enabled
12180       abrt-xorg.service                           enabled
12190       abrtd.service                               enabled
12200       atd.service                                 enabled
12210       auditd.service                              enabled
12220       autovt@.service                             enabled
12230       chronyd.service                             enabled
12240       crond.service                               enabled
12250       dbus-org.freedesktop.NetworkManager.service enabled
12260       dbus-org.freedesktop.nm-dispatcher.service  enabled
12270       default.target                              enabled
```

```
12280         dm-event.socket                          enabled
12290         getty@.service                           enabled
12300         irqbalance.service                       enabled
12310         kdump.service                            enabled
12320         libstoragemgmt.service                   enabled
12330         lvm2-lvmetad.socket                      enabled       ※  LVM を利用しない場合、不要
12340         lvm2-lvmpolld.socket                     enabled       ※  LVM を利用しない場合、不要
12350         lvm2-monitor.service                     enabled       ※  LVM を利用しない場合、不要
12360         microcode.service                        enabled
12370         psacct.service                           enabled
12380         multi-user.target                        enabled
12390         remote-fs.target                         enabled       ※  nfs, iSCSI イニシエータを利用しない場合、不要
12400         rngd.service                             enabled
12410         rpcbind.socket                           enabled       ※  nfs を利用しない場合、不要
12420         rsyslog.service                          enabled
12430         runlevel2.target                         enabled
12440         runlevel3.target                         enabled
12450         runlevel4.target                         enabled
12460         smartd.service                           enabled       ※  仮想環境、RAID コントローラ未対応の場合、不要
12470         sshd.service                             enabled
12480         sysstat.service                          enabled
12490         systemd-readahead-collect.service        enabled
12500         systemd-readahead-drop.service           enabled
12510         systemd-readahead-replay.service         enabled
12520         tuned.service                            enabled
12530         vmtoolsd.service                         enabled       ※  ESXi で動かす場合のみ必要
12540
12550    ○    設定ファイルをバックアップします。
12560
12570 a,s      sudo cp -a /etc{,~}
12580
12590
```

○ 【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 ¥
a,s  fence-agents-ipmilan ¥
a,s  omping ¥
a,s  pcs ¥
a,s  rubygem-abrt ¥
a,s  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 Oct 29 18:33 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。

```
13000 a,s    sudo umount /mnt
13010
13020   ○    インストーラをDVDドライブから外します。
13030
13040 a,s    # Eject DVD
13050
13060   ○    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。
13070
13080 a,s    sudo cp -a /etc{,~}/bash_completion.d/drbdadm
13090 a,s    sudo cp -a /etc{,~}/corosync
13100 a,s    sudo cp -a /etc{,~}/dbus-1/system.d/corosync-signals.conf
13110 a,s    sudo cp -a /etc{,~}/drbd.conf
13120 a,s    sudo cp -a /etc{,~}/drbd.d
13130 a,s    sudo cp -a /etc{,~}/ha.d
13140 a,s    sudo cp -a /etc{,~}/libreport/events.d/ruby_event.conf
13150 a,s    sudo cp -a /etc{,~}/logrotate.d/corosync
13160 a,s    sudo cp -a /etc{,~}/logrotate.d/pacemaker
13170 a,s    sudo cp -a /etc{,~}/logrotate.d/pcsd
13180 a,s    sudo cp -a /etc{,~}/pam.d/pcsd
13190 a,s    sudo cp -a /etc{,~}/sysconfig/corosync
13200 a,s    sudo cp -a /etc{,~}/sysconfig/corosync-notifyd
13210 a,s    sudo cp -a /etc{,~}/sysconfig/crm_mon
13220 a,s    sudo cp -a /etc{,~}/sysconfig/ipmievd
13230 a,s    sudo cp -a /etc{,~}/sysconfig/pacemaker
13240 a,s    sudo cp -a /etc{,~}/sysconfig/pcsd
13250 a,s    sudo cp -a /etc{,~}/target
13260 a,s    sudo cp -a /etc{,~}/xen
13270 a,s    sudo cp -a /etc/passwd   /etc~/passwd_$(date +%Y%m%d_%H%M%S)
13280 a,s    sudo cp -a /etc/passwd-  /etc~/passwd-_$(date +%Y%m%d_%H%M%S)
13290 a,s    sudo cp -a /etc/shadow   /etc~/shadow_$(date +%Y%m%d_%H%M%S)
13300 a,s    sudo cp -a /etc/shadow-  /etc~/shadow-_$(date +%Y%m%d_%H%M%S)
13310 a,s    sudo cp -a /etc/group    /etc~/group_$(date +%Y%m%d_%H%M%S)
13320 a,s    sudo cp -a /etc/group-   /etc~/group-_$(date +%Y%m%d_%H%M%S)
13330 a,s    sudo cp -a /etc/gshadow  /etc~/gshadow_$(date +%Y%m%d_%H%M%S)
13340 a,s    sudo cp -a /etc/gshadow- /etc~/gshadow-_$(date +%Y%m%d_%H%M%S)
13350 a,s
13360   ○    カーネルパラメータを設定します。
13370
13380 a,s    cat << 'EOF' | sudo tee /etc/sysctl.d/tgt.conf
13390 a,s    net.core.netdev_max_backlog = 250000
```

```
13400 a,s    net.core.optmem_max = 16777216
13410 a,s    net.core.rmem_default = 16777216
13420 a,s    net.core.rmem_max = 16777216
13430 a,s    net.core.wmem_default = 16777216
13440 a,s    net.core.wmem_max = 16777216
13450 a,s    net.ipv4.tcp_mem = 39363 209944 314904
13460 a,s    net.ipv4.tcp_rmem = 8192 87380 16777216
13470 a,s    net.ipv4.tcp_wmem = 8192 65536 16777216
13480 a,s    net.ipv4.tcp_no_metrics_save = 1
13490 a,s    net.ipv4.tcp_sack = 0
13500 a,s    net.ipv4.tcp_timestamps = 0
13510 a,s    EOF
13520
13530   ○    再起動します。
13540
13550 a,s    sudo reboot
13560
13570   ○    管理者用一般ユーザにて、ssh でログインします。
13580
13590    a   ssh admin@10.110.88.57
13600    a   admin@10.110.88.57's password: ********
13610
13620    s   ssh admin@10.110.88.58
13630    s   admin@10.110.88.58's password: ********
13640
13650   ○    カーネルパラメータを確認します。
13660
13670 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'
13680        net.core.netdev_max_backlog = 250000
13690        net.core.optmem_max = 16777216
13700        net.core.rmem_default = 16777216
13710        net.core.rmem_max = 16777216
13720        net.core.wmem_default = 16777216
13730        net.core.wmem_max = 16777216
13740        net.ipv4.tcp_mem = 39363        209944  314904
13750        net.ipv4.tcp_no_metrics_save = 1
13760        net.ipv4.tcp_rmem = 8192        87380   16777216
13770        net.ipv4.tcp_sack = 0
13780        net.ipv4.tcp_timestamps = 0
13790        net.ipv4.tcp_wmem = 8192        65536   16777216
```

13800
13810 ○ LVM の設定を変更します。
13820
13830 a, s sudo sed -i -e 's/obtain_device_list_from_udev =.*$/obtain_device_list_from_udev = 0/' /etc/lvm/lvm.conf
13840 a, s sudo sed -i -e 's/use_blkid_wiping =.*$/use_blkid_wiping = 0/' /etc/lvm/lvm.conf
13850 a, s sudo sed -i -e 's/use_lvmetad =.*$/use_lvmetad = 0/' /etc/lvm/lvm.conf
13860 a, s sudo sed -i -e 's/use_lvmpolld =.*$/use_lvmpolld = 0/' /etc/lvm/lvm.conf
13870 a, s sudo sed -i -e 's/write_cache_state =.*$/write_cache_state = 0/' /etc/lvm/lvm.conf
13880 a, s sudo patch --ignore-whitespace /etc/lvm/lvm.conf << 'EOF'
13890 a, s diff -upr /etc/lvm/lvm.conf /etc/lvm/lvm.conf.new
13900 a, s --- /etc/lvm/lvm.conf   2015-11-21 12:01:29.000000000 +0900
13910 a, s +++ /etc/lvm/lvm.conf.new   2016-09-21 07:52:14.164259555 +0900
13920 a, s @@ -139,6 +139,7 @@ devices {
13930 a, s   #
13940 a, s   # This configuration option has an automatic default value.
13950 a, s   # filter = ["a|.*/|"]
13960 a, s +filter = ["r|vg.*|", "a|sd.*|", "a|drbd.*|", "r|.*|"]
13970 a, s
13980 a, s   # Configuration option devices/global_filter.
13990 a, s   # Limit the block devices that are used by LVM system components.
14000 a, s EOF
14010 a, s sudo systemctl stop lvm2-lvmetad.socket
14020 a, s sudo systemctl stop lvm2-lvmpolld.socket
14030 a, s sudo systemctl disable lvm2-lvmetad.socket
14040 a, s sudo systemctl disable lvm2-lvmpolld.socket
14050 a, s sudo rm -f /etc/lvm/cache/.cache
14060 a, s sudo cp -a /etc/lvm/lvm.conf /etc~/lvm/lvm.conf_$(date +%Y%m%d_%H%M%S)
14070
14080 ○ LVM の設定変更を初期化 RAM ディスクに反映します。
14090
14100 a, s for i in /boot/initramfs-*
14110 a, s do
14120 a, s   KVER=$(echo $i | sed -n 's%/boot/initramfs-¥(.*¥).img%¥1%p')
14130 a, s   if echo $KVER | grep -q -v rescue; then
14140 a, s   if echo $KVER | grep -q -v kdump; then
14150 a, s   sudo dracut --force /boot/initramfs-$KVER.img $KVER;
14160 a, s   fi
14170 a, s   fi
14180 a, s done
14190

14200 ○ LVM 物理ボリューム用パーティションを作成します。
14210
14220 a,s `echo Yes | sudo parted /dev/sdc mklabel gpt mkpart primary 1MiB 100% set 1 lvm on`
14230 a,s `echo Yes | sudo parted /dev/sdd mklabel gpt mkpart primary 1MiB 100% set 1 lvm on`
14240 a,s `echo Yes | sudo parted /dev/sde mklabel gpt mkpart primary 1MiB 100% set 1 lvm on`
14250 a,s `echo Yes | sudo parted /dev/sdf mklabel gpt mkpart primary 1MiB 100% set 1 lvm on`
14260 a,s `sudo parted -l`

```
14270 Model: VMware Virtual disk (scsi)
14280 Disk /dev/sda: 17.2GB
14290 Sector size (logical/physical): 512B/512B
14300 Partition Table: msdos
14310 Disk Flags:
14320
14330 Number  Start   End     Size    Type     File system  Flags
14340  1      1049kB  525MB   524MB   primary  xfs          boot
14350  2      525MB   17.2GB  16.7GB  primary  xfs
14360
14370 Model: VMware Virtual disk (scsi)
14380 Disk /dev/sdb: 1074MB
14390 Sector size (logical/physical): 512B/512B
14400 Partition Table: msdos
14410 Disk Flags:
14420
14430 Number  Start   End     Size    Type     File system     Flags
14440  1      1049kB  1074MB  1073MB  primary  linux-swap(v1)
14450
14460 Model: VMware Virtual disk (scsi)
14470 Disk /dev/sdc: 107GB
14480 Sector size (logical/physical): 512B/512B
14490 Partition Table: gpt
14500 Disk Flags:
14510
14520 Number  Start   End    Size   File system  Name     Flags
14530  1      1049kB  107GB  107GB               primary  lvm
14540
14550 Model: VMware Virtual disk (scsi)
14560 Disk /dev/sdd: 107GB
14570 Sector size (logical/physical): 512B/512B
14580 Partition Table: gpt
14590 Disk Flags:
```

```
14600
14610       Number  Start   End     Size    File system  Name     Flags
14620        1      1049kB  107GB   107GB                primary  lvm
14630
14640       Model: VMware Virtual disk (scsi)
14650       Disk /dev/sde: 107GB
14660       Sector size (logical/physical): 512B/512B
14670       Partition Table: gpt
14680       Disk Flags:
14690
14700       Number  Start   End     Size    File system  Name     Flags
14710        1      1049kB  107GB   107GB                primary  lvm
14720
14730       Model: VMware Virtual disk (scsi)
14740       Disk /dev/sdf: 107GB
14750       Sector size (logical/physical): 512B/512B
14760       Partition Table: gpt
14770       Disk Flags:
14780
14790       Number  Start   End     Size    File system  Name     Flags
14800        1      1049kB  107GB   107GB                primary  lvm
14810
14820   ○   LVM 物理ボリュームを作成します。
14830
14840 a,s   sudo pvcreate /dev/sdc1
14850         Physical volume "/dev/sdc1" successfully created
14860
14870 a,s   sudo pvcreate /dev/sdd1
14880         Physical volume "/dev/sdd1" successfully created
14890
14900 a,s   sudo pvcreate /dev/sde1
14910         Physical volume "/dev/sde1" successfully created
14920
14930 a,s   sudo pvcreate /dev/sdf1
14940         Physical volume "/dev/sdf1" successfully created
14950
14960   ○   LVM ボリュームグループを作成します。
14970
14980 a,s   sudo vgcreate -s 4M vg0 /dev/sdc1 /dev/sdd1 /dev/sde1 /dev/sdf1
14990         Volume group "vg0" successfully created
```

15000
15010 ○ LVM 論理ボリュームを作成します。
15020
15030 a,s
```
sudo lvcreate --name lv-drbd0 --extents 90%FREE vg0
```
15040
```
  Logical volume "lv-drbd0" created.
```
15050
15060 ○ LVM の状態を確認します。
15070
15080 a,s
```
sudo pvs
```
15090
```
  PV         VG   Fmt  Attr PSize   PFree
```
15100
```
  /dev/sdc1  vg0  lvm2 a--  100.00g     0
```
15110
```
  /dev/sdd1  vg0  lvm2 a--  100.00g     0
```
15120
```
  /dev/sde1  vg0  lvm2 a--  100.00g     0
```
15130
```
  /dev/sdf1  vg0  lvm2 a--  100.00g 40.00g
```
15140
15150 a,s
```
sudo vgs
```
15160
```
  VG   #PV #LV #SN Attr   VSize   VFree
```
15170
```
  vg0    4   1   0 wz--n- 399.98g 40.00g
```
15180
15190 a,s
```
sudo lvs
```
15200
```
  LV       VG   Attr       LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
```
15210
```
  lv-drbd0 vg0  -wi-a----- 359.98g
```
15220
15230 ○ DRBD の設定ファイルを作成します。
15240
15250 a,s
```
cat /etc/drbd.conf
```
15260
```
# You can find an example in  /usr/share/doc/drbd.../drbd.conf.example
```
15270
15280
```
include "drbd.d/global_common.conf";
```
15290
```
include "drbd.d/*.res";
```
15300
15310 a,s
```
cat << 'EOF' | sudo tee /etc/drbd.d/global_common.conf
```
15320 a,s
```
global {
```
15330 a,s
```
  usage-count no;
```
15340 a,s
```
}
```
15350 a,s
```
common {
```
15360 a,s
```
  handlers {
```
15370 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";
```
15380 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";
```
15390 a,s
```
    fence-peer "/usr/lib/drbd/crm-fence-peer.sh";
```

```
15400 a,s       before-resync-target "/usr/lib/drbd/snapshot-resync-target-lvm.sh -p 4";
15410 a,s       after-resync-target "/usr/lib/drbd/unsnapshot-resync-target-lvm.sh; /usr/lib/drbd/crm-unfence-peer.sh";
15420 a,s     }
15430 a,s     startup {
15440 a,s   #wfc# wfc-timeout 10;
15450 a,s   #wfc# degr-wfc-timeout 10;
15460 a,s   #wfc# outdated-wfc-timeout 10;
15470 a,s     }
15480 a,s     disk {
15490 a,s       on-io-error detach;
15500 a,s       fencing resource-only;
15510 a,s       al-extents 6433;
15520 a,s       c-plan-ahead 20;
15530 a,s       c-delay-target 100;
15540 a,s       c-fill-target 0;
15550 a,s       c-max-rate 100M;
15560 a,s       c-min-rate 1M;
15570 a,s     }
15580 a,s     net {
15590 a,s       protocol C;
15600 a,s       max-buffers 128k;
15610 a,s       sndbuf-size 0;
15620 a,s       rcvbuf-size 0;
15630 a,s       cram-hmac-alg sha1;
15640 a,s       shared-secret "password";
15650 a,s       congestion-fill 100M;
15660 a,s       congestion-extents 2000;
15670 a,s       csums-alg md5;
15680 a,s       verify-alg md5;
15690 a,s       use-rle yes;
15700 a,s     }
15710 a,s   }
15720 a,s   EOF
15730 a,s   sudo cp -a /etc/drbd.d/global_common.conf /etc~/drbd.d/global_common.conf_$(date +%Y%m%d_%H%M%S)
15740 a,s
15750 a,s   cat << 'EOF' | sudo tee /etc/drbd.d/r0.res
15760 a,s   resource r0 {
15770 a,s     volume 0 {
15780 a,s       device /dev/drbd0;
15790 a,s       disk /dev/vg0/lv-drbd0;
```

```
15800 a,s       meta-disk internal;
15810 a,s     }
15820 a,s     on iscsitgt01a.example.com {
15830 a,s       address 192.168.1.2:7788;
15840 a,s     }
15850 a,s     on iscsitgt01s.example.com {
15860 a,s       address 192.168.1.3:7788;
15870 a,s     }
15880 a,s   }
15890 a,s   EOF
15900
15910   ○   DRBD リソースを初期化します。
15920
15930 a,s   sudo drbdadm create-md r0
15940       initializing activity log
15950       NOT initializing bitmap
15960       Writing meta data...
15970       New drbd meta data block successfully created.
15980
15990   ○   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。
16000
16010 a,s   sudo targetcli set global auto_save_on_exit=false
16020       Warning: Could not load preferences file /root/.targetcli/prefs.bin.
16030       Parameter auto_save_on_exit is now 'false'.
16040
16050   ○   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。
16060
16070 a,s   sudo targetcli set global auto_add_default_portal=false
16080       Parameter auto_add_default_portal is now 'false'.
16090
16100   ○   targetcli コマンドのデフォルト設定を確認します。
16110
16120 a,s   sudo targetcli get global
16130       GLOBAL CONFIG GROUP
16140       ===================
16150       auto_add_default_portal=false
16160       ----------------------------
16170       If true, adds a portal listening on all IPs to new targets.
16180
16190       auto_add_mapped_luns=true
```

```
16200       -------------------------
16210       If true, automatically create node ACLs mapped LUNs after creating a new target LUN or a new node ACL
16220
16230       auto_cd_after_create=false
16240       --------------------------
16250       If true, changes current path to newly created objects.
16260
16270       auto_enable_tpgt=true
16280       ---------------------
16290       If true, automatically enables TPGTs upon creation.
16300
16310       auto_save_on_exit=false
16320       -----------------------
16330       If true, saves configuration on exit.
16340
16350       color_command=cyan
16360       ------------------
16370       Color to use for command completions.
16380
16390       color_default=none
16400       ------------------
16410       Default text display color.
16420
16430       color_keyword=cyan
16440       ------------------
16450       Color to use for keyword completions.
16460
16470       color_mode=true
16480       ---------------
16490       Console color display mode.
16500
16510       color_parameter=magenta
16520       -----------------------
16530       Color to use for parameter completions.
16540
16550       color_path=magenta
16560       ------------------
16570       Color to use for path completions
16580
16590       export_backstore_name_as_model=true
```

```
16600       ----------------------------------
16610       If true, the backstore name is used for the scsi inquiry model name.
16620
16630       logfile=/root/.targetcli/log.txt
16640       --------------------------------
16650       Logfile to use.
16660
16670       loglevel_console=info
16680       ---------------------
16690       Log level for messages going to the console.
16700
16710       loglevel_file=debug
16720       -------------------
16730       Log level for messages going to the log file.
16740
16750       prompt_length=30
16760       ----------------
16770       Max length of the shell prompt path, 0 for infinite.
16780
16790       tree_max_depth=0
16800       ----------------
16810       Maximum depth of displayed node tree.
16820
16830       tree_round_nodes=true
16840       ---------------------
16850       Tree node display style.
16860
16870       tree_show_root=true
16880       -------------------
16890       Whether or not to display tree root.
16900
16910       tree_status_mode=true
16920       ---------------------
16930       Whether or not to display status in tree.
16940
```

16950 ○ LIO のリソース・エージェントを作成します。

```
16960
16970 a,s   cat << 'EOF_LIO' | sudo tee /usr/lib/ocf/resource.d/heartbeat/LIO
16980 a,s   #!/bin/bash
16990 a,s   #
```

```
17000 a,s   #     LIO OCF RA. manages iSCSI target LIO.
17010 a,s   #
17020 a,s   #   (c) 2009-2010 Florian Haas, Dejan Muhamedagic,
17030 a,s   #                 and Linux-HA contributors
17040 a,s   #
17050 a,s   #      modified by Katsuaki Hamada (hamada@pc-office.net), 23 Oct 2016
17060 a,s   #
17070 a,s   # This program is free software; you can redistribute it and/or modify
17080 a,s   # it under the terms of version 2 of the GNU General Public License as
17090 a,s   # published by the Free Software Foundation.
17100 a,s   #
17110 a,s   # This program is distributed in the hope that it would be useful, but
17120 a,s   # WITHOUT ANY WARRANTY; without even the implied warranty of
17130 a,s   # MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
17140 a,s   #
17150 a,s   # Further, this software is distributed without any warranty that it is
17160 a,s   # free of the rightful claim of any third person regarding infringement
17170 a,s   # or the like.  Any license provided herein, whether implied or
17180 a,s   # otherwise, applies only to this software file.  Patent licenses, if
17190 a,s   # any, provided herein do not apply to combinations of this program with
17200 a,s   # other software, or any other product whatsoever.
17210 a,s   #
17220 a,s   # You should have received a copy of the GNU General Public License
17230 a,s   # along with this program; if not, write the Free Software Foundation,
17240 a,s   # Inc., 59 Temple Place - Suite 330, Boston MA 02111-1307, USA.
17250 a,s   #
17260 a,s
17270 a,s   ######################################################################
17280 a,s   # Initialization:
17290 a,s   : ${OCF_FUNCTIONS_DIR=${OCF_ROOT}/lib/heartbeat}
17300 a,s   . ${OCF_FUNCTIONS_DIR}/ocf-shellfuncs
17310 a,s
17320 a,s   # Lockfile, used for selecting a target ID
17330 a,s   LOCKFILE=${HA_RSCTMP}/target.lock
17340 a,s   ######################################################################
17350 a,s
17360 a,s   meta_data() {
17370 a,s           cat <<END
17380 a,s   <?xml version="1.0"?>
17390 a,s   <!DOCTYPE resource-agent SYSTEM "ra-api-1.dtd">
```

```
17400 a,s    <resource-agent name="LIO" version="1.0">
17410 a,s    <version>0.9</version>
17420 a,s
17430 a,s    <longdesc lang="en">
17440 a,s    Manages iSCSI target LIO. An iSCSI target is a collection of SCSI Logical
17450 a,s    Units (LUs) exported via a daemon that speaks the iSCSI protocol.
17460 a,s    </longdesc>
17470 a,s    <shortdesc lang="en">iSCSI target export agent</shortdesc>
17480 a,s
17490 a,s    <parameters>
17500 a,s    <parameter name="iqn" required="1" unique="1">
17510 a,s    <longdesc lang="en">
17520 a,s    The target iSCSI Qualified Name (IQN). Should follow the conventional
17530 a,s    iqn.yyyy-mm.&lt;reversed domain name&gt;[:identifier] syntax.
17540 a,s    </longdesc>
17550 a,s    <shortdesc lang="en">iSCSI target IQN</shortdesc>
17560 a,s    <content type="string" />
17570 a,s    </parameter>
17580 a,s    </parameters>
17590 a,s
17600 a,s    <actions>
17610 a,s    <action name="start" timeout="10" />
17620 a,s    <action name="stop" timeout="10" />
17630 a,s    <action name="status" timeout="10" interval="10" depth="0" />
17640 a,s    <action name="monitor" timeout="10" interval="10" depth="0" />
17650 a,s    <action name="meta-data" timeout="5" />
17660 a,s    <action name="validate-all" timeout="10" />
17670 a,s    </actions>
17680 a,s    </resource-agent>
17690 a,s    END
17700 a,s    }
17710 a,s
17720 a,s    ######################################################################
17730 a,s
17740 a,s    LIO_usage() {
17750 a,s      cat <<END
17760 a,s    usage: $0 {start|stop|status|monitor|validate-all|meta-data}
17770 a,s
17780 a,s    Expects to have a fully populated OCF RA-compliant environment set.
17790 a,s    END
```

```
17800 a,s   }
17810 a,s
17820 a,s   LIO_start() {
17830 a,s     LIO_monitor
17840 a,s     [ $? =  $OCF_SUCCESS ] && return $OCF_SUCCESS
17850 a,s     /usr/bin/targetctl restore
17860 a,s     LIO_monitor
17870 a,s   }
17880 a,s
17890 a,s   LIO_stop() {
17900 a,s     LIO_monitor
17910 a,s     [ $? -eq $OCF_NOT_RUNNING ] || /usr/bin/targetctl clear
17920 a,s     return $OCF_SUCCESS
17930 a,s   }
17940 a,s
17950 a,s   LIO_monitor() {
17960 a,s     # if we have no configfs entry for the target, it's definitely stopped
17970 a,s     [ -d /sys/kernel/config/target/iscsi/${OCF_RESKEY_iqn} ] || return $OCF_NOT_RUNNING
17980 a,s
17990 a,s     # if the target is there, but its TPG is not enabled, then we also consider it stopped
18000 a,s     [ $(cat /sys/kernel/config/target/iscsi/${OCF_RESKEY_iqn}/tpgt_1/enable) -eq 1 ] || return $OCF_NOT_RUNNING
18010 a,s
18020 a,s     return $OCF_SUCCESS
18030 a,s   }
18040 a,s
18050 a,s   LIO_validate() {
18060 a,s     if ! ocf_is_probe; then
18070 a,s       # Do we have all required binaries?
18080 a,s       check_binary targetctl
18090 a,s     fi
18100 a,s     return $OCF_SUCCESS
18110 a,s   }
18120 a,s
18130 a,s   case $1 in
18140 a,s     meta-data)  meta_data; exit $OCF_SUCCESS;;
18150 a,s     usage|help) LIO_usage; exit $OCF_SUCCESS;;
18160 a,s   esac
18170 a,s
18180 a,s   # Everything except usage and meta-data must pass the validate test
18190 a,s   LIO_validate
```

```
18200 a,s
18210 a,s   case $__OCF_ACTION in
18220 a,s     start)          LIO_start;;
18230 a,s     stop)           LIO_stop;;
18240 a,s     monitor|status) LIO_monitor;;
18250 a,s     reload)         ocf_log err "Reloading..."; LIO_start;;
18260 a,s     validate-all)   ;;
18270 a,s     *)              LIO_usage; exit $OCF_ERR_UNIMPLEMENTED;;
18280 a,s   esac
18290 a,s   rc=$?
18300 a,s   ocf_log debug "${OCF_RESOURCE_INSTANCE} $__OCF_ACTION : $rc"
18310 a,s   exit $rc
18320 a,s   EOF_LIO
18330 a,s   sudo chmod 755 /usr/lib/ocf/resource.d/heartbeat/LIO
18340
18350   ○   VIP に関するリソース・エージェント (IPaddr2) の名前を変更します。
18360
18370 a,s   sed -e 's/IPaddr2/VIP/g' /usr/lib/ocf/resource.d/heartbeat/IPaddr2 | sudo tee /usr/lib/ocf/resource.d/heartbeat/VIP > /dev/null
18380 a,s   sudo chmod 755 /usr/lib/ocf/resource.d/heartbeat/VIP
18390
18400           ※  LVM, LIO, VIP リソース・エージェント名文字数を統一し、「sudo pcs status」等の実行結果を見やすくします。
18410           ※  問い合わせを行う時は、IPaddr2 を上記のコマンドで変更している点を伝えないと話が通じないものと思われます。
18420
18430   ○   pcs の利用環境を整えます。
18440
18450 a,s   echo 'password' | sudo passwd --stdin hacluster
18460       Changing password for user hacluster.
18470       passwd: all authentication tokens updated successfully.
18480
18490 a,s   sudo cp -a /etc/shadow    /etc~/shadow_$(date +%Y%m%d_%H%M%S)
18500 a,s   sudo cp -a /etc/shadow-   /etc~/shadow-_$(date +%Y%m%d_%H%M%S)
18510
18520 a,s   sudo usermod -a -G haclient admin
18530
18540 a,s   id admin
18550       uid=1000(admin) gid=1000(admin) groups=1000(admin),10(wheel),189(haclient)
18560
18570 a,s   sudo usermod -a -G haclient monitor
18580
18590 a,s   id monitor
```

```
18600       uid=1001(monitor) gid=1001(monitor) groups=1001(monitor),189(haclient)
18610
18620 a,s   sudo cp -a /etc/group    /etc~/group_$(date +%Y%m%d_%H%M%S)
18630 a,s   sudo cp -a /etc/group-   /etc~/group-_$(date +%Y%m%d_%H%M%S)
18640
18650 a,s   sudo systemctl start pcsd
18660 a,s   sudo systemctl enable pcsd
18670       Created symlink from /etc/systemd/system/multi-user.target.wants/pcsd.service to /usr/lib/systemd/system/pcsd.service.
18680
18690   ○   Corosync のサービス設定を変更します。
18700
18710 a,s   sed -e 's/^#Restart=on-failure.*$/Restart=on-failure/' ¥
18720 a,s    -e 's/^#RestartSec=.*$/RestartSec=70/' ¥
18730 a,s    -e 's%^#ExecStartPre=/sbin/modprobe softdog soft_margin=.*$%ExecStartPre=/sbin/modprobe softdog soft_margin=6%' ¥
18740 a,s    /usr/lib/systemd/system/corosync.service | sudo tee /etc/systemd/system/corosync.service
18750       [Unit]
18760       Description=Corosync Cluster Engine
18770       ConditionKernelCommandLine=!nocluster
18780       Requires=network-online.target
18790       After=network-online.target
18800
18810       [Service]
18820       ExecStart=/usr/share/corosync/corosync start
18830       ExecStop=/usr/share/corosync/corosync stop
18840       Type=forking
18850
18860       # The following config is for corosync with enabled watchdog service.
18870       #
18880       #  When corosync watchdog service is being enabled and using with
18890       #  pacemaker.service, and if you want to exert the watchdog when a
18900       #  corosync process is terminated abnormally,
18910       #  uncomment the line of the following Restart= and RestartSec=.
18920       Restart=on-failure
18930       #  Specify a period longer than soft_margin as RestartSec.
18940       RestartSec=70
18950       #  rewrite according to environment.
18960       ExecStartPre=/sbin/modprobe softdog soft_margin=6
18970
18980       [Install]
18990       WantedBy=multi-user.target
```

```
19000
19010           ※  カーネル内のソフトウェア watchdog 機能を有効化します。
19020           ※  Corosync プロセス障害検知時間を6秒以内とします。
19030
19040 a,s    cat /etc/sysconfig/corosync
19050        # Corosync init script configuration file
19060
19070        # COROSYNC_INIT_TIMEOUT specifies number of seconds to wait for corosync
19080        # initialization (default is one minute).
19090        COROSYNC_INIT_TIMEOUT=60
19100
19110        # COROSYNC_OPTIONS specifies options passed to corosync command
19120        # (default is no options).
19130        # See "man corosync" for detailed descriptions of the options.
19140        COROSYNC_OPTIONS=""
19150
19160    ○   Pacemaker のサービス設定を変更します。
19170
19180 a,s    sed -e "s%^# ExecStopPost=/bin/sh -c 'pidof crmd || killall -TERM corosync'$%ExecStopPost=/bin/sh -c 'pidof crmd || killall -TERM corosync'%" ¥
19190 a,s     /usr/lib/systemd/system/pacemaker.service | sudo tee /etc/systemd/system/pacemaker.service
19200        [Unit]
19210        Description=Pacemaker High Availability Cluster Manager
19220
19230        After=dbus.service
19240        After=basic.target
19250        After=syslog.service
19260        After=network.target
19270        After=corosync.service
19280
19290        Requires=dbus.service
19300        Requires=basic.target
19310        Requires=corosync.service
19320        # if you use crm_mon, uncomment the line below.
19330        # Wants=crm_mon.service
19340
19350        [Install]
19360        WantedBy=multi-user.target
19370
19380        [Service]
19390        Type=simple
```

```
19400       KillMode=process
19410       NotifyAccess=main
19420       EnvironmentFile=-/etc/sysconfig/pacemaker
19430       EnvironmentFile=-/etc/sysconfig/sbd
19440       SuccessExitStatus=100
19450
19460       ExecStart=/usr/sbin/pacemakerd -f
19470
19480       # If pacemakerd doesn't stop, its probably waiting on a cluster
19490       # resource.  Sending -KILL will just get the node fenced
19500       SendSIGKILL=no
19510
19520       # If we ever hit the StartLimitInterval/StartLimitBurst limit and the
19530       # admin wants to stop the cluster while pacemakerd is not running, it
19540       # might be a good idea to enable the ExecStopPost directive below.
19550       #
19560       # Although the node will likely end up being fenced as a result so its
19570       # not on by default
19580       #
19590       # ExecStopPost=/usr/bin/killall -TERM crmd attrd fenced cib pengine lrmd
19600
19610       # If you want Corosync to stop whenever Pacemaker is stopped,
19620       # uncomment the next line too:
19630       #
19640       ExecStopPost=/bin/sh -c 'pidof crmd || killall -TERM corosync'
19650
19660       # Uncomment this for older versions of systemd that didn't support
19670       # TimeoutStopSec
19680       # TimeoutSec=30min
19690
19700       # Pacemaker can only exit after all managed services have shut down
19710       # A HA database could conceivably take even longer than this
19720       TimeoutStopSec=30min
19730       TimeoutStartSec=60s
19740
19750       # Restart options include: no, on-success, on-failure, on-abort or always
19760       Restart=on-failure
19770
19780       # crm_perror() writes directly to stderr, so ignore it here
19790       # to avoid double-logging with the wrong format
```

```
19800       StandardError=null
19810
19820       # if you use crm_mon, uncomment the line below.
19830       # ExecStopPost=/bin/sh -c 'systemctl status crm_mon >/dev/null && systemctl stop crm_mon'
19840
19850           ※  Pacemaker サービス停止時に Corosync サービスを停止します。
19860
19870 a,s   sudo sed -i -e 's/^# PCMK_fail_fast=.*$/PCMK_fail_fast=yes/' /etc/sysconfig/pacemaker
19880 a,s   sudo cp -a /etc/sysconfig/pacemaker /etc~/sysconfig/pacemaker_$(date +%Y%m%d_%H%M%S)
19890 a,s   cat /etc/sysconfig/pacemaker
19900       # For non-systemd based systems, prefix export to each enabled line
19910
19920       # Turn on special handling for CMAN clusters in the init script
19930       # Without this, fenced (and by inference, cman) cannot reliably be made to shut down
19940       # PCMK_STACK=cman
19950
19960       #==#==# Variables that control logging
19970
19980       # Enable debug logging globally or per-subsystem
19990       # Multiple subsystems may me listed separated by commas
20000       # eg. PCMK_debug=crmd,pengine
20010       # PCMK_debug=yes|no|crmd|pengine|cib|stonith-ng|attrd|pacemakerd
20020
20030       # Send INFO (and higher) messages to the named log file
20040       # Additional messages may also appear here depending on any configured debug and trace settings
20050       # By default Pacemaker will inherit the logfile specified in corosync.conf
20060       # PCMK_logfile=/var/log/pacemaker.log
20070
20080       # Specify an alternate syslog target for NOTICE (and higher) messages
20090       # Use 'none' to disable - not recommended
20100       # The default value is 'daemon'
20110       # PCMK_logfacility=none|daemon|user|local0|local1|local2|local3|local4|local5|local6|local7
20120
20130       # Send all messages up-to-and-including the configured priority to syslog
20140       # A value of 'info' will be far too verbose for most installations and 'debug' is almost certain to send you blind
20150       # The default value is 'notice'
20160       # PCMK_logpriority=emerg|alert|crit|error|warning|notice|info|debug
20170
20180       # Log all messages from a comma-separated list of functions
20190       # PCMK_trace_functions=function1,function2,function3
```

```
20200
20210       # Log all messages from a comma-separated list of files (no path)
20220       # Supports wildcards eg. PCMK_trace_files=prefix*.c
20230       # PCMK_trace_files=file.c,other.h
20240
20250       # Log all messages matching comma-separated list of formats
20260       # PCMK_trace_formats="Sent delete %d"
20270
20280       # Log all messages from a comma-separated list of tags
20290       # PCMK_trace_tags=tag1,tag2
20300
20310       # Dump the blackbox whenever the message at function and line is printed
20320       # eg. PCMK_trace_blackbox=te_graph_trigger:223,unpack_clone:81
20330       # PCMK_trace_blackbox=fn:line,fn2:line2,...
20340
20350       # Enable blackbox logging globally or per-subsystem
20360       # The blackbox contains a rolling buffer of all logs (including info+debug+trace)
20370       # and is written after a crash, assertion failure and/or when SIGTRAP is received
20380       #
20390       # The blackbox recorder can also be enabled for Pacemaker daemons at runtime by
20400       # sending SIGUSR1 (or SIGTRAP), and disabled by sending SIGUSR2
20410       #
20420       # Multiple subsystems may me listed separated by commas
20430       # eg. PCMK_blackbox=crmd,pengine
20440       # PCMK_blackbox=yes|no|crmd|pengine|cib|stonith-ng|attrd|pacemakerd
20450
20460       #==#==# Advanced use only
20470
20480       # Enable this for compatibility with older corosync (prior to 2.0)
20490       # based clusters which used the nodes uname as its uuid also
20500       # PCMK_uname_is_uuid=no
20510
20520       # Specify an alternate location for RNG schemas and XSL transforms
20530       # Mostly only useful for developer testing
20540       # PCMK_schema_directory=/some/path
20550
20560       # Enable this for rebooting this machine at the time of process (subsystem) failure
20570       PCMK_fail_fast=yes
20580
20590       #==#==# Pacemaker Remote
```

```
20600       # Use a custom directory for finding the authkey.
20610       # PCMK_authkey_location=/etc/pacemaker/authkey
20620       #
20630       # Specify a custom port for Pacemaker Remote connections
20640       # PCMK_remote_port=3121
20650
20660       #==#==# IPC
20670
20680       # Force use of a particular class of IPC connection
20690       # PCMK_ipc_type=shared-mem|socket|posix|sysv
20700
20710       # Specify an IPC buffer size in bytes
20720       # Useful when connecting to really big clusters that exceed the default 20k buffer
20730       # PCMK_ipc_buffer=20480
20740
20750       #==#==# Profiling and memory leak testing
20760
20770       # Variables for running child daemons under valgrind and/or checking for memory problems
20780       # G_SLICE=always-malloc
20790       # MALLOC_PERTURB_=221 # or 0
20800       # MALLOC_CHECK_=3     # or 0,1,2
20810       # PCMK_valgrind_enabled=yes
20820       # PCMK_valgrind_enabled=cib,crmd
20830       # PCMK_callgrind_enabled=yes
20840       # PCMK_callgrind_enabled=cib,crmd
20850       # VALGRIND_OPTS="--leak-check=full --trace-children=no --num-callers=25 --log-file=/var/lib/pacemaker/valgrind-%p
20860        --suppressions=/usr/share/pacemaker/tests/valgrind-pcmk.suppressions --gen-suppressions=all"
20870
20880           ※  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。
20890
20900   ○   Pacemaker のリソース設定スクリプトを作成します。
20910
20920 a, s   cat << 'EOF' | sudo tee /etc/ha.d/crm.sh
20930 a, s   #!/bin/bash
20940 a, s   pcs property set batch-limit=30
20950 a, s   pcs property set cluster-delay=60
20960 a, s   pcs property set cluster-recheck-interval=15min
20970 a, s   pcs property set crmd-finalization-timeout=30min
20980 a, s   pcs property set crmd-integration-timeout=3min
20990 a, s   pcs property set crmd-transition-delay=0s
```

```
21000 a, s    pcs property set dc-deadtime=20s
21010 a, s    pcs property set default-action-timeout=20
21020 a, s    pcs property set election-timeout=2min
21030 a, s    pcs property set enable-acl=true --force
21040 a, s    pcs property set enable-startup-probes=true
21050 a, s    pcs property set is-managed-default=true
21060 a, s    pcs property set load-threshold=80%
21070 a, s    pcs property set maintenance-mode=false
21080 a, s    pcs property set migration-limit=-1
21090 a, s    pcs property set no-quorum-policy=ignore
21100 a, s    pcs property set node-action-limit=0
21110 a, s    pcs property set node-health-green=0
21120 a, s    pcs property set node-health-red=-INFINITY
21130 a, s    pcs property set node-health-strategy=none
21140 a, s    pcs property set node-health-yellow=0
21150 a, s    pcs property set notification-agent=/dev/null
21160 a, s    pcs property set pe-error-series-max=100
21170 a, s    pcs property set pe-input-series-max=100
21180 a, s    pcs property set pe-warn-series-max=100
21190 a, s    pcs property set placement-strategy=default
21200 a, s    pcs property set remove-after-stop=false
21210 a, s    pcs property set shutdown-escalation=20min
21220 a, s    pcs property set start-failure-is-fatal=true
21230 a, s    pcs property set startup-fencing=true
21240 a, s    pcs property set stonith-action=reboot
21250 a, s    pcs property set stonith-enabled=false
21260 a, s    pcs property set stonith-timeout=60
21270 a, s    pcs property set stop-all-resources=false
21280 a, s    pcs property set stop-orphan-actions=true
21290 a, s    pcs property set stop-orphan-resources=true
21300 a, s    pcs property set symmetric-cluster=true
21310 a, s
21320 a, s    pcs resource defaults resource-stickiness=200 migration-threshold=2
21330 a, s
21340 a, s    pcs acl role create write-access description="Full access" write xpath /cib
21350 a, s    pcs acl role create read-only description="Read access to cluster" read xpath /cib
21360 a, s
21370 a, s    pcs acl user create admin write-access
21380 a, s    pcs acl user create monitor read-only
21390 a, s
```

```
21400 a,s   pcs resource create p_drbd_r0 ocf:linbit:drbd ¥
21410 a,s     params drbd_resource=r0 ¥
21420 a,s     op start                          timeout=240 ¥
21430 a,s     op monitor interval=10 role=Master timeout=20 ¥
21440 a,s     op monitor interval=20 role=Slave  timeout=20 ¥
21450 a,s     op notify                         timeout=90 ¥
21460 a,s     op stop                           timeout=100 ¥
21470 a,s     op promote                        timeout=90 ¥
21480 a,s     op demote                         timeout=90
21490 a,s
21500 a,s   pcs resource master ms_drbd_r0 p_drbd_r0 ¥
21510 a,s     meta master-max=1 master-node-max=1 clone-max=2 ¥
21520 a,s     clone-node-max=1 notify=true target-role=Started ¥
21530 a,s     is-managed=true
21540 a,s
21550 a,s   pcs resource create p_lvm ocf:heartbeat:LVM ¥
21560 a,s     params volgrpname=vg1 ¥
21570 a,s     op start              timeout=30 ¥
21580 a,s     op monitor interval=5 timeout=10 ¥
21590 a,s     op stop               timeout=30
21600 a,s
21610 a,s   pcs resource create p_lio ocf:heartbeat:LIO ¥
21620 a,s     params iqn=iqn.2016-09.com.example:iscsitgt01 ¥
21630 a,s     op start              timeout=10 ¥
21640 a,s     op monitor interval=5 timeout=5 ¥
21650 a,s     op stop               timeout=10
21660 a,s
21670 a,s   pcs resource create p_vip ocf:heartbeat:VIP ¥
21680 a,s     params ip=10.110.88.59 cidr_netmask=26 nic=bond0 iflabel=1 arp_interval=200 arp_count=5 ¥
21690 a,s     op start              timeout=20 ¥
21700 a,s     op monitor interval=5 timeout=10 ¥
21710 a,s     op stop               timeout=20
21720 a,s
21730 a,s   pcs resource group add g_tgt p_lvm p_lio p_vip
21740 a,s
21750 a,s   pcs constraint location add lc_tgt g_tgt iscsitgt01a.example.com 100
21760 a,s
21770 a,s   pcs constraint colocation add g_tgt ¥
21780 a,s     ms_drbd_r0 INFINITY with-rsc-role=Master
21790 a,s
```

```
21800 a,s    pcs constraint order promote ms_drbd_r0 then start p_lvm
21810 a,s    EOF
21820 a,s    sudo chmod 755 /etc/ha.d/crm.sh
21830 a,s    sudo cp -a /etc{,~}/ha.d/crm.sh
21840
21850        ※  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。
21860
21870   ○    Active 機と Stand-by 機の間の疎通を確認します。
21880
21890 a,s    ping -c 1 -M do -s 8972 10.110.88.57 || echo Error
21900        PING 10.110.88.57 (10.110.88.57) 8972(9000) bytes of data.
21910        8980 bytes from 10.110.88.57: icmp_seq=1 ttl=64 time=0.136 ms
21920
21930        --- 10.110.88.57 ping statistics ---
21940        1 packets transmitted, 1 received, 0% packet loss, time 0ms
21950        rtt min/avg/max/mdev = 0.136/0.136/0.136/0.000 ms
21960
21970 a,s    traceroute -F 10.110.88.57 8972
21980        traceroute to 10.110.88.57 (10.110.88.57), 30 hops max, 8972 byte packets
21990         1  iscsitgt01a.example.com (10.110.88.57)  0.303 ms  0.265 ms  0.256 ms
22000
22010 a,s    ping -c 1 -M do -s 8972 10.110.88.58 || echo Error
22020 a,s    traceroute -F 10.110.88.58 8972
22030
22040 a,s    ping -c 1 -M do -s 8972 192.168.1.2 || echo Error
22050 a,s    traceroute -F 192.168.1.2 8972
22060
22070 a,s    ping -c 1 -M do -s 8972 192.168.1.3 || echo Error
22080 a,s    traceroute -F 192.168.1.3 8972
22090
22100   ○    Active 機で ssh 鍵を作成し、Stand-by 機にコピーします。
22110
22120    a   ssh-keygen -q -f ~/.ssh/id_rsa -N ""
22130    a   mv -f ~/.ssh/id_rsa.pub ~/.ssh/authorized_keys
22140    a   scp -pr .ssh/ iscsitgt01s:
22150        The authenticity of host 'iscsitgt01s (10.110.88.58)' can't be established.
22160        ECDSA key fingerprint is cf:3a:39:91:fc:c9:ac:5c:4e:16:38:72:97:88:28:b2.
22170    a   Are you sure you want to continue connecting (yes/no)? yes
22180        Warning: Permanently added 'iscsitgt01s,10.110.88.58' (ECDSA) to the list of known hosts.
22190    a   admin@iscsitgt01s's password: ********
```

```
22200         id_rsa                                        100% 1679     1.6KB/s   00:00
22210         authorized_keys                               100%  411     0.4KB/s   00:00
22220         known_hosts                                   100%  186     0.2KB/s   00:00
22230
22240   ○     Active 機と Stand-by 機で、ssh 鍵を root アカウント用にコピーします。
22250
22260 a,s      sudo cp -a .ssh/ /root/
22270 a,s      sudo chown -R root:root /root/.ssh
22280
22290   ○     Active 機と Stand-by 機でほぼ同時に DRBD サービスを起動します。
22300
22310 a,s      sudo systemctl start drbd.service
22320
22330   ○     Stand-by 機で DRBD の状態をワッチします。
22340
22350    s     watch cat /proc/drbd
22360         Every 2.0s: cat /proc/drbd                          Sat Oct 29 18:33:24 2016
22370
22380         version: 8.4.5 (api:1/proto:86-101)
22390         srcversion: 1AEFF755B8BD61B81A0AF27
22400          0: cs:Connected ro:Secondary/Secondary ds:Inconsistent/Inconsistent C r-----
22410             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:3759976
22420
22430   ○     Active 機で DRBD の初期同期を開始します。
22440
22450    a     sudo drbdadm primary --force all
22460
22470   ○     Stand-by 機で DRBD の状態を確認します。
22480
22490         Every 2.0s: cat /proc/drbd                          Sat Oct 29 18:33:24 2016
22500
22510         version: 8.4.5 (api:1/proto:86-101)
22520         srcversion: 1AEFF755B8BD61B81A0AF27
22530          0: cs:SyncTarget ro:Secondary/Primary ds:Inconsistent/UpToDate C r-----
22540             ns:0 nr:0 dw:0 dr:1244 al:0 bm:0 lo:0 pe:0 ua:0 ap:0 ep:1 wo:f oos:3758732
22550                 [>....................] sync'ed:  0.2% (3758732/3759976)K
22560                 finish: 0:39:09 speed: 1,244 (1,244) want: 10,400 K/sec
22570
22580         ※  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。
22590
```

```
Every 2.0s: cat /proc/drbd                      Sat Oct 29 18:33:24 2016

version: 8.4.5 (api:1/proto:86-101)
srcversion: 1AEFF755B8BD61B81A0AF27
 0: cs:Connected ro:Secondary/Primary ds:UpToDate/UpToDate C r-----
    ns:0 nr:0 dw:0 dr:3759976 al:0 bm:0 lo:0 pe:0 ua:0 ap:0 ep:1 wo:f oos:0
```

※　「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。

○　**Active 機で DRBD デバイス上に LVM を構成します。**

a
```
sudo pvcreate /dev/drbd0
  Physical volume "/dev/drbd0" successfully created
```

a
```
sudo vgcreate -s 4M vg1 /dev/drbd0
  Volume group "vg1" successfully created
```

a
```
sudo lvcreate --name lv-lun0 --extents 20%VG vg1
  Logical volume "lv-lun0" created.
```

a
```
sudo lvcreate --name lv-lun1 --extents 20%VG vg1
  Logical volume "lv-lun1" created.
```

a
```
sudo lvcreate --name lv-lun2 --extents 20%VG vg1
  Logical volume "lv-lun2" created.
```

a
```
sudo lvcreate --name lv-lun3 --extents 20%VG vg1
  Logical volume "lv-lun3" created.
```

a
```
sudo pvs
  PV         VG   Fmt  Attr PSize   PFree
  /dev/drbd0 vg1  lvm2 a--  359.97g 72.00g
  /dev/sdc1  vg0  lvm2 a--  100.00g     0
  /dev/sdd1  vg0  lvm2 a--  100.00g     0
  /dev/sde1  vg0  lvm2 a--  100.00g     0
  /dev/sdf1  vg0  lvm2 a--  100.00g 40.00g
```

a
```
sudo vgs
  VG   #PV #LV #SN Attr   VSize   VFree
  vg0    4   1   0 wz--n- 399.98g 40.00g
```

```
23000         vg1     1   4   0 wz--n- 359.97g 72.00g
23010
23020   a   sudo lvs
23030         LV       VG   Attr       LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
23040         lv-drbd0 vg0  -wi-ao---- 359.98g
23050         lv-lun0  vg1  -wi-a-----  71.99g
23060         lv-lun1  vg1  -wi-a-----  71.99g
23070         lv-lun2  vg1  -wi-a-----  71.99g
23080         lv-lun3  vg1  -wi-a-----  71.99g
23090
23100   ○   Active 機で、targetcli から状態を確認します。
23110
23120   a   sudo targetcli ls /
23130       o- / ......................................................................... [...]
23140         o- backstores .............................................................. [...]
23150         | o- block .................................................. [Storage Objects: 0]
23160         | o- fileio ................................................. [Storage Objects: 0]
23170         | o- pscsi .................................................. [Storage Objects: 0]
23180         | o- ramdisk ................................................ [Storage Objects: 0]
23190         o- iscsi ........................................................... [Targets: 0]
23200         o- loopback ........................................................ [Targets: 0]
23210
23220   ○   Active 機で、IQN を定義します。
23230
23240   a   sudo targetcli /iscsi create iqn.2016-09.com.example:iscsitgt01
23250       Created target iqn.2016-09.com.example:iscsitgt01.
23260       Created TPG 1.
23270
23280   a   sudo targetcli ls /
23290       o- / ......................................................................... [...]
23300         o- backstores .............................................................. [...]
23310         | o- block .................................................. [Storage Objects: 0]
23320         | o- fileio ................................................. [Storage Objects: 0]
23330         | o- pscsi .................................................. [Storage Objects: 0]
23340         | o- ramdisk ................................................ [Storage Objects: 0]
23350         o- iscsi ........................................................... [Targets: 1]
23360         | o- iqn.2016-09.com.example:iscsitgt01 ..................................... [TPGs: 1]
23370         |   o- tpg1 ....................................... [no-gen-acls, no-auth]
23380         |     o- acls ..................................................... [ACLs: 0]
23390         |     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/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/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/tpg1/acls/iqn.2016-09.com.example:initiator01 set auth password='password-user01'
Parameter password is now 'password-user01'.


a sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/acls create iqn.2016-09.com.example:initiator02
Created Node ACL for iqn.2016-09.com.example:initiator02

a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/acls/iqn.2016-09.com.example:initiator02 set auth userid=iscsiuser02
Parameter userid is now 'iscsiuser02'.

a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/acls/iqn.2016-09.com.example:initiator02 set auth password='password-user02'
Parameter password is now 'password-user02'.


a sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/acls create iqn.2016-09.com.example:initiator03
Created Node ACL for iqn.2016-09.com.example:initiator03

a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/acls/iqn.2016-09.com.example:initiator03 set auth userid=iscsiuser03
Parameter userid is now 'iscsiuser03'.

a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/acls/iqn.2016-09.com.example:initiator03 set auth password='password-user03'
Parameter password is now 'password-user03'.


a sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/acls create iqn.2016-09.com.example:initiator04
Created Node ACL for iqn.2016-09.com.example:initiator04

a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/acls/iqn.2016-09.com.example:initiator04 set auth userid=iscsiuser04
Parameter userid is now 'iscsiuser04'.
```

```
23800
23810   a    sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/acls/iqn.2016-09.com.example:initiator04 set auth password='password-user04'
23820       Parameter password is now 'password-user04'.
23830
23840   a   sudo targetcli ls /
23850       o- / ..................................................................... [...]
23860         o- backstores ......................................................... [...]
23870         | o- block ............................................ [Storage Objects: 0]
23880         | o- fileio ........................................... [Storage Objects: 0]
23890         | o- pscsi ............................................ [Storage Objects: 0]
23900         | o- ramdisk .......................................... [Storage Objects: 0]
23910         o- iscsi ....................................................... [Targets: 1]
23920         | o- iqn.2016-09.com.example:iscsitgt01 ........................... [TPGs: 1]
23930         |   o- tpg1 ....................................... [no-gen-acls, no-auth]
23940         |     o- acls ..................................................... [ACLs: 4]
23950         |     | o- iqn.2016-09.com.example:initiator01 ..... [Mapped LUNs: 0]
23960         |     | o- iqn.2016-09.com.example:initiator02 ..... [Mapped LUNs: 0]
23970         |     | o- iqn.2016-09.com.example:initiator03 ..... [Mapped LUNs: 0]
23980         |     | o- iqn.2016-09.com.example:initiator04 ..... [Mapped LUNs: 0]
23990         |     o- luns ..................................................... [LUNs: 0]
24000         |     o- portals ................................................. [Portals: 0]
24010         o- loopback .................................................... [Targets: 0]
24020
24030   ○   Active 機で、バックエンド・デバイスを指定し、IQN に紐付けます。
24040
24050   a   sudo targetcli /backstores/block create name=lun0 dev=/dev/vg1/lv-lun0
24060       Created block storage object lun0 using /dev/vg1/lv-lun0.
24070
24080   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/luns create /backstores/block/lun0
24090       Created LUN 0.
24100       Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator04
24110       Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator03
24120       Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator02
24130       Created LUN 0->0 mapping in node ACL iqn.2016-09.com.example:initiator01
24140
24150
24160   a   sudo targetcli /backstores/block create name=lun1 dev=/dev/vg1/lv-lun1
24170       Created block storage object lun1 using /dev/vg1/lv-lun1.
24180
24190   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/luns create /backstores/block/lun1
```

```
24200       Created LUN 1.
24210       Created LUN 1->1 mapping in node ACL iqn.2016-09.com.example:initiator04
24220       Created LUN 1->1 mapping in node ACL iqn.2016-09.com.example:initiator03
24230       Created LUN 1->1 mapping in node ACL iqn.2016-09.com.example:initiator02
24240       Created LUN 1->1 mapping in node ACL iqn.2016-09.com.example:initiator01
24250
24260
24270   a   sudo targetcli /backstores/block create name=lun2 dev=/dev/vg1/lv-lun2
24280       Created block storage object lun2 using /dev/vg1/lv-lun2.
24290
24300   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/luns create /backstores/block/lun2
24310       Created LUN 2.
24320       Created LUN 2->2 mapping in node ACL iqn.2016-09.com.example:initiator04
24330       Created LUN 2->2 mapping in node ACL iqn.2016-09.com.example:initiator03
24340       Created LUN 2->2 mapping in node ACL iqn.2016-09.com.example:initiator02
24350       Created LUN 2->2 mapping in node ACL iqn.2016-09.com.example:initiator01
24360
24370
24380   a   sudo targetcli /backstores/block create name=lun3 dev=/dev/vg1/lv-lun3
24390       Created block storage object lun3 using /dev/vg1/lv-lun3.
24400
24410   a   sudo targetcli /iscsi/iqn.2016-09.com.example:iscsitgt01/tpg1/luns create /backstores/block/lun3
24420       Created LUN 3.
24430       Created LUN 3->3 mapping in node ACL iqn.2016-09.com.example:initiator04
24440       Created LUN 3->3 mapping in node ACL iqn.2016-09.com.example:initiator03
24450       Created LUN 3->3 mapping in node ACL iqn.2016-09.com.example:initiator02
24460       Created LUN 3->3 mapping in node ACL iqn.2016-09.com.example:initiator01
24470
24480   a   sudo targetcli ls /
24490       o- / ......................................................................... [...]
24500         o- backstores .............................................................. [...]
24510         | o- block .................................................. [Storage Objects: 4]
24520         | | o- lun0 ............... [/dev/vg1/lv-lun0 (732.0MiB) write-thru activated]
24530         | | o- lun1 ............... [/dev/vg1/lv-lun1 (732.0MiB) write-thru activated]
24540         | | o- lun2 ............... [/dev/vg1/lv-lun2 (732.0MiB) write-thru activated]
24550         | | o- lun3 ............... [/dev/vg1/lv-lun3 (732.0MiB) write-thru activated]
24560         | o- fileio ................................................. [Storage Objects: 0]
24570         | o- pscsi .................................................. [Storage Objects: 0]
24580         | o- ramdisk ................................................ [Storage Objects: 0]
24590         o- iscsi ............................................................ [Targets: 1]
```

```
      | o- iqn.2016-09.com.example:iscsitgt01 ........................... [TPGs: 1]
      |   o- tpg1 ....................................... [no-gen-acls, no-auth]
      |     o- acls ..................................................... [ACLs: 4]
      |     | o- iqn.2016-09.com.example:initiator01 ..... [Mapped LUNs: 4]
      |     | | o- mapped_lun0 ........................... [lun0 block/lun0 (rw)]
      |     | | o- mapped_lun1 ........................... [lun1 block/lun1 (rw)]
      |     | | o- mapped_lun2 ........................... [lun2 block/lun2 (rw)]
      |     | | o- mapped_lun3 ........................... [lun3 block/lun3 (rw)]
      |     | o- iqn.2016-09.com.example:initiator02 ..... [Mapped LUNs: 4]
      |     | | o- mapped_lun0 ........................... [lun0 block/lun0 (rw)]
      |     | | o- mapped_lun1 ........................... [lun1 block/lun1 (rw)]
      |     | | o- mapped_lun2 ........................... [lun2 block/lun2 (rw)]
      |     | | o- mapped_lun3 ........................... [lun3 block/lun3 (rw)]
      |     | o- iqn.2016-09.com.example:initiator03 ..... [Mapped LUNs: 4]
      |     | | o- mapped_lun0 ........................... [lun0 block/lun0 (rw)]
      |     | | o- mapped_lun1 ........................... [lun1 block/lun1 (rw)]
      |     | | o- mapped_lun2 ........................... [lun2 block/lun2 (rw)]
      |     | | o- mapped_lun3 ........................... [lun3 block/lun3 (rw)]
      |     | o- iqn.2016-09.com.example:initiator04 ..... [Mapped LUNs: 4]
      |     |   o- mapped_lun0 ........................... [lun0 block/lun0 (rw)]
      |     |   o- mapped_lun1 ........................... [lun1 block/lun1 (rw)]
      |     |   o- mapped_lun2 ........................... [lun2 block/lun2 (rw)]
      |     |   o- mapped_lun3 ........................... [lun3 block/lun3 (rw)]
      |     o- luns ..................................................... [LUNs: 4]
      |     | o- lun0 ........................... [block/lun0 (/dev/vg1/lv-lun0)]
      |     | o- lun1 ........................... [block/lun1 (/dev/vg1/lv-lun1)]
      |     | o- lun2 ........................... [block/lun2 (/dev/vg1/lv-lun2)]
      |     | o- lun3 ........................... [block/lun3 (/dev/vg1/lv-lun3)]
      |     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/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 ................................................... [...]
```

```
25000         | o- block ..................................................... [Storage Objects: 4]
25010         | | o- lun0 ............... [/dev/vg1/lv-lun0 (732.0MiB) write-thru activated]
25020         | | o- lun1 ............... [/dev/vg1/lv-lun1 (732.0MiB) write-thru activated]
25030         | | o- lun2 ............... [/dev/vg1/lv-lun2 (732.0MiB) write-thru activated]
25040         | | o- lun3 ............... [/dev/vg1/lv-lun3 (732.0MiB) write-thru activated]
25050         | o- fileio .................................................... [Storage Objects: 0]
25060         | o- pscsi ..................................................... [Storage Objects: 0]
25070         | o- ramdisk ................................................... [Storage Objects: 0]
25080         o- iscsi ................................................................ [Targets: 1]
25090         | o- iqn.2016-09.com.example:iscsitgt01 ........................... [TPGs: 1]
25100         |   o- tpg1 ..................................... [no-gen-acls, no-auth]
25110         |     o- acls ............................................................ [ACLs: 4]
25120         |     | o- iqn.2016-09.com.example:initiator01 ............... [Mapped LUNs: 4]
25130         |     | | o- mapped_lun0 ............................. [lun0 block/lun0 (rw)]
25140         |     | | o- mapped_lun1 ............................. [lun1 block/lun1 (rw)]
25150         |     | | o- mapped_lun2 ............................. [lun2 block/lun2 (rw)]
25160         |     | | o- mapped_lun3 ............................. [lun3 block/lun3 (rw)]
25170         |     | o- iqn.2016-09.com.example:initiator02 ............... [Mapped LUNs: 4]
25180         |     | | o- mapped_lun0 ............................. [lun0 block/lun0 (rw)]
25190         |     | | o- mapped_lun1 ............................. [lun1 block/lun1 (rw)]
25200         |     | | o- mapped_lun2 ............................. [lun2 block/lun2 (rw)]
25210         |     | | o- mapped_lun3 ............................. [lun3 block/lun3 (rw)]
25220         |     | o- iqn.2016-09.com.example:initiator03 ............... [Mapped LUNs: 4]
25230         |     | | o- mapped_lun0 ............................. [lun0 block/lun0 (rw)]
25240         |     | | o- mapped_lun1 ............................. [lun1 block/lun1 (rw)]
25250         |     | | o- mapped_lun2 ............................. [lun2 block/lun2 (rw)]
25260         |     | | o- mapped_lun3 ............................. [lun3 block/lun3 (rw)]
25270         |     | o- iqn.2016-09.com.example:initiator04 ............... [Mapped LUNs: 4]
25280         |     |   o- mapped_lun0 ............................. [lun0 block/lun0 (rw)]
25290         |     |   o- mapped_lun1 ............................. [lun1 block/lun1 (rw)]
25300         |     |   o- mapped_lun2 ............................. [lun2 block/lun2 (rw)]
25310         |     |   o- mapped_lun3 ............................. [lun3 block/lun3 (rw)]
25320         |     o- luns ............................................................ [LUNs: 4]
25330         |     | o- lun0 ............................. [block/lun0 (/dev/vg1/lv-lun0)]
25340         |     | o- lun1 ............................. [block/lun1 (/dev/vg1/lv-lun1)]
25350         |     | o- lun2 ............................. [block/lun2 (/dev/vg1/lv-lun2)]
25360         |     | o- lun3 ............................. [block/lun3 (/dev/vg1/lv-lun3)]
25370         |     o- portals ...................................................... [Portals: 1]
25380         |       o- 10.110.88.59:3260 ..................................................... [OK]
25390         o- loopback ............................................................. [Targets: 0]
```

```
25400
25410   a   ss -ant | grep LISTEN.¥*3260
25420       LISTEN     0      256    10.110.88.59:3260                    *:*
25430
25440   ○   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。
25450
25460   a   sudo targetcli saveconfig
25470       Last 10 configs saved in /etc/target/backup.
25480       Configuration saved to /etc/target/saveconfig.json
25490
25500   a   sudo scp -p /etc/target/saveconfig.json iscsitgt01s:/etc/target/saveconfig.json
25510       saveconfig.json                                100%   11KB  11.0KB/s   00:00
25520
25530   ○   Active 機で、設定ファイルを確認します。
25540
25550   a   sudo cat /etc/target/saveconfig.json
25560       {
25570         "fabric_modules": [],
25580         "storage_objects": [
25590           {
25600             "attributes": {
25610               "block_size": 512,
25620               "emulate_3pc": 1,
25630               "emulate_caw": 1,
25640               "emulate_dpo": 0,
25650               "emulate_fua_read": 0,
25660               "emulate_fua_write": 1,
25670               "emulate_model_alias": 1,
25680               "emulate_rest_reord": 0,
25690               "emulate_tas": 1,
25700               "emulate_tpu": 0,
25710               "emulate_tpws": 0,
25720               "emulate_ua_intlck_ctrl": 0,
25730               "emulate_write_cache": 0,
25740               "enforce_pr_isids": 1,
25750               "force_pr_aptpl": 0,
25760               "is_nonrot": 0,
25770               "max_unmap_block_desc_count": 0,
25780               "max_unmap_lba_count": 0,
25790               "max_write_same_len": 65535,
```

```
            "optimal_sectors": 2048,
            "pi_prot_format": 0,
            "pi_prot_type": 0,
            "queue_depth": 128,
            "unmap_granularity": 0,
            "unmap_granularity_alignment": 0
          },
          "dev": "/dev/vg1/lv-lun3",
          "name": "lun3",
          "plugin": "block",
          "readonly": false,
          "write_back": false,
          "wwn": "33ef34a3-b07f-4876-baf8-e71fdc525e04"
        },
        {
          "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": 0,
            "max_unmap_lba_count": 0,
            "max_write_same_len": 65535,
            "optimal_sectors": 2048,
            "pi_prot_format": 0,
            "pi_prot_type": 0,
            "queue_depth": 128,
            "unmap_granularity": 0,
```

```
            "unmap_granularity_alignment": 0
          },
          "dev": "/dev/vg1/lv-lun2",
          "name": "lun2",
          "plugin": "block",
          "readonly": false,
          "write_back": false,
          "wwn": "7d7f8d13-78e6-4b0a-aacb-fee219526219"
        },
        {
          "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": 0,
            "max_unmap_lba_count": 0,
            "max_write_same_len": 65535,
            "optimal_sectors": 2048,
            "pi_prot_format": 0,
            "pi_prot_type": 0,
            "queue_depth": 128,
            "unmap_granularity": 0,
            "unmap_granularity_alignment": 0
          },
          "dev": "/dev/vg1/lv-lun1",
          "name": "lun1",
          "plugin": "block",
```

```
      "readonly": false,
      "write_back": false,
      "wwn": "43ab697b-6d1e-4d18-b7df-7dd1dd272965"
    },
    {
      "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": 0,
        "max_unmap_lba_count": 0,
        "max_write_same_len": 65535,
        "optimal_sectors": 2048,
        "pi_prot_format": 0,
        "pi_prot_type": 0,
        "queue_depth": 128,
        "unmap_granularity": 0,
        "unmap_granularity_alignment": 0
      },
      "dev": "/dev/vg1/lv-lun0",
      "name": "lun0",
      "plugin": "block",
      "readonly": false,
      "write_back": false,
      "wwn": "37a29689-9f83-4f15-9624-471980ea8f45"
    }
  ],
```

```
27000         "targets": [
27010           {
27020             "fabric": "iscsi",
27030             "tpgs": [
27040               {
27050                 "attributes": {
27060                   "authentication": 0,
27070                   "cache_dynamic_acls": 0,
27080                   "default_cmdsn_depth": 64,
27090                   "default_erl": 0,
27100                   "demo_mode_discovery": 1,
27110                   "demo_mode_write_protect": 1,
27120                   "fabric_prot_type": 0,
27130                   "generate_node_acls": 0,
27140                   "login_timeout": 15,
27150                   "netif_timeout": 2,
27160                   "prod_mode_write_protect": 0,
27170                   "t10_pi": 0
27180                 },
27190                 "enable": true,
27200                 "luns": [
27210                   {
27220                     "index": 3,
27230                     "storage_object": "/backstores/block/lun3"
27240                   },
27250                   {
27260                     "index": 2,
27270                     "storage_object": "/backstores/block/lun2"
27280                   },
27290                   {
27300                     "index": 1,
27310                     "storage_object": "/backstores/block/lun1"
27320                   },
27330                   {
27340                     "index": 0,
27350                     "storage_object": "/backstores/block/lun0"
27360                   }
27370                 ],
27380                 "node_acls": [
27390                   {
```

```
27400                 "attributes": {
27410                   "dataout_timeout": 3,
27420                   "dataout_timeout_retries": 5,
27430                   "default_erl": 0,
27440                   "nopin_response_timeout": 30,
27450                   "nopin_timeout": 15,
27460                   "random_datain_pdu_offsets": 0,
27470                   "random_datain_seq_offsets": 0,
27480                   "random_r2t_offsets": 0
27490                 },
27500                 "chap_password": "password-user04",
27510                 "chap_userid": "iscsiuser04",
27520                 "mapped_luns": [
27530                   {
27540                     "index": 3,
27550                     "tpg_lun": 3,
27560                     "write_protect": false
27570                   },
27580                   {
27590                     "index": 2,
27600                     "tpg_lun": 2,
27610                     "write_protect": false
27620                   },
27630                   {
27640                     "index": 1,
27650                     "tpg_lun": 1,
27660                     "write_protect": false
27670                   },
27680                   {
27690                     "index": 0,
27700                     "tpg_lun": 0,
27710                     "write_protect": false
27720                   }
27730                 ],
27740                 "node_wwn": "iqn.2016-09.com.example:initiator04"
27750               },
27760               {
27770                 "attributes": {
27780                   "dataout_timeout": 3,
27790                   "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": 3,
        "tpg_lun": 3,
        "write_protect": false
      },
      {
        "index": 2,
        "tpg_lun": 2,
        "write_protect": false
      },
      {
        "index": 1,
        "tpg_lun": 1,
        "write_protect": false
      },
      {
        "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,
```

```
28200                 "random_datain_pdu_offsets": 0,
28210                 "random_datain_seq_offsets": 0,
28220                 "random_r2t_offsets": 0
28230               },
28240               "chap_password": "password-user02",
28250               "chap_userid": "iscsiuser02",
28260               "mapped_luns": [
28270                 {
28280                   "index": 3,
28290                   "tpg_lun": 3,
28300                   "write_protect": false
28310                 },
28320                 {
28330                   "index": 2,
28340                   "tpg_lun": 2,
28350                   "write_protect": false
28360                 },
28370                 {
28380                   "index": 1,
28390                   "tpg_lun": 1,
28400                   "write_protect": false
28410                 },
28420                 {
28430                   "index": 0,
28440                   "tpg_lun": 0,
28450                   "write_protect": false
28460                 }
28470               ],
28480               "node_wwn": "iqn.2016-09.com.example:initiator02"
28490             },
28500             {
28510               "attributes": {
28520                 "dataout_timeout": 3,
28530                 "dataout_timeout_retries": 5,
28540                 "default_erl": 0,
28550                 "nopin_response_timeout": 30,
28560                 "nopin_timeout": 15,
28570                 "random_datain_pdu_offsets": 0,
28580                 "random_datain_seq_offsets": 0,
28590                 "random_r2t_offsets": 0
```

```
                    },
                    "chap_password": "password-user01",
                    "chap_userid": "iscsiuser01",
                    "mapped_luns": [
                      {
                        "index": 3,
                        "tpg_lun": 3,
                        "write_protect": false
                      },
                      {
                        "index": 2,
                        "tpg_lun": 2,
                        "write_protect": false
                      },
                      {
                        "index": 1,
                        "tpg_lun": 1,
                        "write_protect": false
                      },
                      {
                        "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"
        }
      ]
    }
```

○ 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------  71.99g
  lv-lun1  vg1  -wi------  71.99g
  lv-lun2  vg1  -wi------  71.99g
  lv-lun3  vg1  -wi------  71.99g
```

○ Active 機で、DRBD リソースを secondary 化（デモート）します。

a
```
sudo drbdadm secondary all
```

○ 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。

```
Every 2.0s: cat /proc/drbd                              Sat Oct 29 18:33:24 2016

version: 8.4.5 (api:1/proto:86-101)
srcversion: 1AEFF755B8BD61B81A0AF27
```
s
```
 0: cs:Connected ro:Secondary/Secondary ds:UpToDate/UpToDate C r-----
    ns:0 nr:100 dw:100 dr:3759976 al:0 bm:0 lo:0 pe:0 ua:0 ap:0 ep:1 wo:f oos:0
```

○ Active 機と Stand-by 機で、drbd.service を停止します。

a, s
```
sudo systemctl stop drbd.service
```

a, s
```
cat /proc/drbd
cat: /proc/drbd: No such file or directory
```

○ Active 機で、Corosync の認証を設定し、起動します。

a
```
sudo pcs cluster auth iscsitgt01a.example.com iscsitgt01s.example.com 10.110.88.57 10.110.88.58 ¥
```
a
```
 192.168.1.2 192.168.1.3 -u hacluster -p 'password' --force
iscsitgt01s.example.com: Authorized
iscsitgt01a.example.com: Authorized
10.110.88.58: Authorized
```

```
29800       192.168.1.2: Authorized
29810       192.168.1.3: Authorized
29820       10.110.88.57: Authorized
29830
29840   a   sudo cat /var/lib/pcsd/tokens
29850       {
29860         "format_version": 2,
29870         "data_version": 4,
29880         "tokens": {
29890           "10.110.88.57": "77189e9e-3be0-40ce-b81e-3e5e6525e885",
29900           "10.110.88.58": "9e3f4ae9-b15e-49c9-b6ee-eb8c1b91783a",
29910           "192.168.1.2": "53da862f-ad22-445b-8887-add50d385736",
29920           "192.168.1.3": "4f78d9c6-34a4-4486-8ba1-e69f0d4e1257",
29930           "iscsitgt01a.example.com": "002cd1c0-2ab2-4a4c-a1a7-4bf14b61b822",
29940           "iscsitgt01s.example.com": "1a9981a9-04e6-461b-b904-c5df8b4c9815"
29950         }
29960       }
29970
29980   a   sudo pcs cluster setup --name iscsitgt01 10.110.88.57,192.168.1.2 10.110.88.58,192.168.1.3 ¥
29990   a    --transport=udp --rrpmode=passive -u hacluster -p 'password' --force
30000       Shutting down pacemaker/corosync services...
30010       Redirecting to /bin/systemctl stop  pacemaker.service
30020       Redirecting to /bin/systemctl stop  corosync.service
30030       Killing any remaining services...
30040       Removing all cluster configuration files...
30050       10.110.88.57: Succeeded
30060       10.110.88.58: Succeeded
30070       Synchronizing pcsd certificates on nodes 10.110.88.57, 10.110.88.58...
30080       10.110.88.57: Success
30090       10.110.88.58: Success
30100
30110       Restaring pcsd on the nodes in order to reload the certificates...
30120       10.110.88.57: Success
30130       10.110.88.58: Success
30140
30150   a   cat /etc/corosync/corosync.conf
30160       totem {
30170           version: 2
30180           secauth: off
30190           cluster_name: iscsitgt01
```

```
30200           transport: udp
30210           rrp_mode: passive
30220       }
30230
30240       nodelist {
30250           node {
30260               ring0_addr: 10.110.88.57
30270               ring1_addr: 192.168.1.2
30280               nodeid: 1
30290           }
30300
30310           node {
30320               ring0_addr: 10.110.88.58
30330               ring1_addr: 192.168.1.3
30340               nodeid: 2
30350           }
30360       }
30370
30380       quorum {
30390           provider: corosync_votequorum
30400           two_node: 1
30410       }
30420
30430       logging {
30440           to_logfile: yes
30450           logfile: /var/log/cluster/corosync.log
30460           to_syslog: yes
30470       }
30480
30490   a   sudo pcs cluster start --all
30500       10.110.88.57: Starting Cluster...
30510       10.110.88.58: Starting Cluster...
30520
30530   a   sudo pcs status corosync
30540       Membership information
30550       ----------------------
30560           Nodeid      Votes Name
30570                1          1 10.110.88.57 (local)
30580                2          1 10.110.88.58
30590
```

```
30600   a   sudo pcs status
30610       Cluster name: iscsitgt01
30620       WARNING: no stonith devices and stonith-enabled is not false
30630       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
30640       Last updated: Tue Oct 29 18:33:24 2016          Last change: Tue Oct 29 18:33:24 2016 by hacluster via crmd on iscsitgt01a.example.com
30650       Stack: corosync
30660       Current DC: iscsitgt01s.example.com (version 1.1.13-10.el7-44eb2dd) - partition with quorum
30670       2 nodes and 0 resources configured
30680
30690       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
30700
30710       No resources
30720
30730       Daemon Status:
30740         corosync: active/disabled
30750         pacemaker: active/disabled
30760         pcsd: active/enabled
30770
30780           ※  「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。
30790           ※  「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。
30800           ※  「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。
30810
30820   ○   Active 機と Stand-by 機で、Corosync の状態とプロセスを確認します。
30830
30840   a   sudo corosync-cfgtool -s
30850       Printing ring status.
30860       Local node ID 1
30870       RING ID 0
30880               id      = 10.110.88.57
30890               status  = ring 0 active with no faults
30900       RING ID 1
30910               id      = 192.168.1.2
30920               status  = ring 1 active with no faults
30930
30940   s   sudo corosync-cfgtool -s
30950       Printing ring status.
30960       Local node ID 2
30970       RING ID 0
30980               id      = 10.110.88.58
30990               status  = ring 0 active with no faults
```

```
31000       RING ID 1
31010               id      = 192.168.1.3
31020               status  = ring 1 active with no faults
31030
31040 a,s   ps -ef | egrep '[c]orosync|[p]acemaker'
31050       root      38502      1  0 19:49 ?        00:00:00 corosync
31060       root      38517      1  0 19:49 ?        00:00:00 /usr/sbin/pacemakerd -f
31070       haclust+  38518  38517  0 19:49 ?        00:00:00 /usr/libexec/pacemaker/cib
31080       root      38519  38517  0 19:49 ?        00:00:00 /usr/libexec/pacemaker/stonithd
31090       root      38520  38517  0 19:49 ?        00:00:00 /usr/libexec/pacemaker/lrmd
31100       haclust+  38521  38517  0 19:49 ?        00:00:00 /usr/libexec/pacemaker/attrd
31110       haclust+  38522  38517  0 19:49 ?        00:00:00 /usr/libexec/pacemaker/pengine
31120       haclust+  38523  38517  0 19:49 ?        00:00:00 /usr/libexec/pacemaker/crmd
31130
31140   ○   Active 機で、クラスタにリソースを登録します。
31150
31160    a  sudo /etc/ha.d/crm.sh
31170       Adding ms_drbd_r0 p_lvm (kind: Mandatory) (Options: first-action=promote then-action=start)
31180
31190   ○   Active 機で、状態を確認します。
31200
31210    a  sudo pcs status
31220       Cluster name: iscsitgt01
31230       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
31240       Last updated: Sat Oct 29 18:33:24 2016          Last change: Sat Oct 29 18:33:24 2016 by root via cibadmin on iscsitgt01s.example.com
31250       Stack: corosync
31260       Current DC: iscsitgt01s.example.com (version 1.1.13-10.el7-44eb2dd) - partition with quorum
31270       2 nodes and 5 resources configured
31280
31290       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
31300
31310       Full list of resources:
31320
31330        Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
31340            p_drbd_r0  (ocf::linbit:drbd):     FAILED iscsitgt01a.example.com (unmanaged)
31350            p_drbd_r0  (ocf::linbit:drbd):     FAILED iscsitgt01s.example.com (unmanaged)
31360        Resource Group: g_tgt
31370            p_lvm      (ocf::heartbeat:LVM):   Stopped
31380            p_lio      (ocf::heartbeat:LIO):   Stopped
31390            p_vip      (ocf::heartbeat:VIP):   Stopped
```

```
31400
31410       Failed Actions:
31420       * p_drbd_r0_stop_0 on iscsitgt01a.example.com 'not configured' (6): call=6, status=complete, exitreason='none',
31430           last-rc-change='Sat Oct 29 18:33:24 2016', queued=0ms, exec=24ms
31440       * p_lvm_start_0 on iscsitgt01a.example.com 'unknown error' (1): call=11, status=complete, exitreason='Volume group
31450        [vg1] does not exist or contains error!   Volume group "vg1" not found',
31460           last-rc-change='Sat Oct 29 18:33:24 2016', queued=0ms, exec=101ms
31470       * p_drbd_r0_stop_0 on iscsitgt01s.example.com 'not configured' (6): call=6, status=complete, exitreason='none',
31480           last-rc-change='Sat Oct 29 18:33:24 2016', queued=0ms, exec=23ms
31490       * p_lvm_start_0 on iscsitgt01s.example.com 'unknown error' (1): call=15, status=complete, exitreason='Volume group
31500        [vg1] does not exist or contains error!   Volume group "vg1" not found',
31510           last-rc-change='Tue Oct 29 18:33:24 2016', queued=0ms, exec=190ms
31520
31530       Daemon Status:
31540         corosync: active/disabled
31550         pacemaker: active/disabled
31560         pcsd: active/enabled
31570
31580   ○   Active 機で、リソースのエラー情報をクリアします。
31590
31600    a  sudo pcs resource cleanup
31610       Waiting for 1 replies from the CRMd. OK
31620
31630   ○   Active 機で、状態を確認します。
31640
31650    a  sudo pcs status
31660       Cluster name: iscsitgt01
31670       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
31680       Last updated: Sat Oct 29 18:33:24 2016          Last change: Sat Oct 29 18:33:24 2016 by hacluster via crmd on iscsitgt01a.example.com
31690       Stack: corosync
31700       Current DC: iscsitgt01s.example.com (version 1.1.13-10.el7-44eb2dd) - partition with quorum
31710       2 nodes and 5 resources configured
31720
31730       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
31740
31750       Full list of resources:
31760
31770        Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
31780            Masters: [ iscsitgt01a.example.com ]
31790            Slaves: [ iscsitgt01s.example.com ]
```

```
31800         Resource Group: g_tgt
31810             p_lvm      (ocf::heartbeat:LVM):   Started iscsitgt01a.example.com
31820             p_lio      (ocf::heartbeat:LIO):   Started iscsitgt01a.example.com
31830             p_vip      (ocf::heartbeat:VIP):   Started iscsitgt01a.example.com
31840
31850       Daemon Status:
31860         corosync: active/disabled
31870         pacemaker: active/disabled
31880         pcsd: active/enabled
31890
```

○ Active 機と Stand-by 機で、設定情報を保存します。

```
31910
31920 a,s   sudo pcs config | sudo tee /etc/ha.d/crm.conf
31930       Cluster Name: iscsitgt01
31940       Corosync Nodes:
31950        10.110.88.57 10.110.88.58
31960       Pacemaker Nodes:
31970        iscsitgt01a.example.com iscsitgt01s.example.com
31980
31990       Resources:
32000        Master: ms_drbd_r0
32010         Meta Attrs: master-max=1 master-node-max=1 clone-max=2 clone-node-max=1 notify=true target-role=Started is-managed=true
32020         Resource: p_drbd_r0 (class=ocf provider=linbit type=drbd)
32030          Attributes: drbd_resource=r0
32040          Operations: start interval=0s timeout=240 (p_drbd_r0-start-interval-0s)
32050                      monitor interval=10 role=Master timeout=20 (p_drbd_r0-monitor-interval-10)
32060                      monitor interval=20 role=Slave timeout=20 (p_drbd_r0-monitor-interval-20)
32070                      notify interval=0s timeout=90 (p_drbd_r0-notify-interval-0s)
32080                      stop interval=0s timeout=100 (p_drbd_r0-stop-interval-0s)
32090                      promote interval=0s timeout=90 (p_drbd_r0-promote-interval-0s)
32100                      demote interval=0s timeout=90 (p_drbd_r0-demote-interval-0s)
32110        Group: g_tgt
32120         Resource: p_lvm (class=ocf provider=heartbeat type=LVM)
32130          Attributes: volgrpname=vg1
32140          Operations: start interval=0s timeout=30 (p_lvm-start-interval-0s)
32150                      monitor interval=10 timeout=30 (p_lvm-monitor-interval-10)
32160                      stop interval=0s timeout=30 (p_lvm-stop-interval-0s)
32170         Resource: p_lio (class=ocf provider=heartbeat type=LIO)
32180          Attributes: iqn=iqn.2016-09.com.example:iscsitgt01
32190          Operations: start interval=0s timeout=10 (p_lio-start-interval-0s)
```

```
                monitor interval=10 timeout=10 (p_lio-monitor-interval-10)
                stop interval=0s timeout=10 (p_lio-stop-interval-0s)
  Resource: p_vip (class=ocf provider=heartbeat type=VIP)
   Attributes: ip=10.110.88.59 cidr_netmask=26 nic=bond0 iflabel=1 arp_interval=200 arp_count=5
   Operations: start interval=0s timeout=20 (p_vip-start-interval-0s)
               monitor interval=10 timeout=20 (p_vip-monitor-interval-10)
               stop interval=0s timeout=20 (p_vip-stop-interval-0s)

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)

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: 1.1.13-10.el7-44eb2dd
 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
 no-quorum-policy: ignore
 node-action-limit: 0
 node-health-green: 0
 node-health-red: -INFINITY
 node-health-strategy: none
 node-health-yellow: 0
 notification-agent: /dev/null
 pe-error-series-max: 100
 pe-input-series-max: 100
 pe-warn-series-max: 100
 placement-strategy: default
 remove-after-stop: false
 shutdown-escalation: 20min
 start-failure-is-fatal: true
 startup-fencing: true
 stonith-action: reboot
 stonith-enabled: false
 stonith-timeout: 60
 stop-all-resources: false
 stop-orphan-actions: true
 stop-orphan-resources: true
 symmetric-cluster: true

a,s  sudo cp -a /etc{,~}/ha.d/crm.conf

```

○ Active 機で、スイッチオーバ（手動フェイルオーバ）させます。

```
 a  sudo pcs resource move g_tgt
    Warning: Creating location constraint cli-ban-g_tgt-on-iscsitgt01a.example.com with a score of -INFINITY for resource g_tgt on
     node iscsitgt01a.example.com.
    This will prevent g_tgt from running on iscsitgt01a.example.com until the constraint is removed. This will be the case even if
     iscsitgt01a.example.com is the last node in the cluster.

```

○ Active 機で、状態を確認します。

```
33000   a   sudo pcs status
33010       Cluster name: iscsitgt01
33020       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
33030       Last updated: Sat Oct 29 18:33:24 2016          Last change: Sat Oct 29 18:33:24 2016 by root via crm_resource on iscsitgt01a.example.com
33040       Stack: corosync
33050       Current DC: iscsitgt01s.example.com (version 1.1.13-10.el7-44eb2dd) - partition with quorum
33060       2 nodes and 5 resources configured
33070
33080       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
33090
33100       Full list of resources:
33110
33120        Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
33130            Masters: [ iscsitgt01s.example.com ]
33140            Slaves: [ iscsitgt01a.example.com ]
33150        Resource Group: g_tgt
33160            p_lvm      (ocf::heartbeat:LVM):   Started iscsitgt01s.example.com
33170            p_lio      (ocf::heartbeat:LIO):   Started iscsitgt01s.example.com
33180            p_vip      (ocf::heartbeat:VIP):   Started iscsitgt01s.example.com
33190
33200       Daemon Status:
33210         corosync: active/disabled
33220         pacemaker: active/disabled
33230         pcsd: active/enabled
33240
33250           ※  「p_vip」のノードが変わるまで、何回か実行します。
33260
33270   ○   Active 機で、設定変更を確認します。
33280
33290   a   diff <(grep -v last-lrm-refresh /etc/ha.d/crm.conf) <(sudo pcs config | grep -v last-lrm-refresh)
33300       41a42
33310       >     Disabled on: iscsitgt01a.example.com (score:-INFINITY) (role: Started) (id:cli-ban-g_tgt-on-iscsitgt01a.example.com)
33320
33330   ○   Active 機で、設定変更を元に戻します。
33340
33350   a   sudo pcs resource clear g_tgt
33360   a   diff <(grep -v last-lrm-refresh /etc/ha.d/crm.conf) <(sudo pcs config | grep -v last-lrm-refresh)
33370
33380   ○   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。
33390
```

```
33400    a   sudo pcs resource move g_tgt; sleep 5; sudo pcs resource clear g_tgt
33410        Warning: Creating location constraint cli-ban-g_tgt-on-iscsitgt01s.example.com with a score of -INFINITY for resource g_tgt on
33420         node iscsitgt01s.example.com.
33430        This will prevent g_tgt from running on iscsitgt01s.example.com until the constraint is removed. This will be the case even if
33440         iscsitgt01s.example.com is the last node in the cluster.
33450
33460    ○   Active 機で、状態を確認します。
33470
33480    a   sudo pcs status
33490        Cluster name: iscsitgt01
33500        WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
33510        Last updated: Tue Oct 29 18:33:24 2016          Last change: Tue Oct 29 18:33:24 2016 by root via crm_resource on iscsitgt01a.example.com
33520        Stack: corosync
33530        Current DC: iscsitgt01s.example.com (version 1.1.13-10.el7-44eb2dd) - partition with quorum
33540        2 nodes and 6 resources configured
33550
33560        Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
33570
33580        Full list of resources:
33590
33600         Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
33610             Masters: [ iscsitgt01a.example.com ]
33620             Slaves: [ iscsitgt01s.example.com ]
33630         Resource Group: g_tgt
33640             p_lvm       (ocf::heartbeat:LVM):    Started iscsitgt01a.example.com
33650             p_lio       (ocf::heartbeat:LIO):    Started iscsitgt01a.example.com
33660             p_vip       (ocf::heartbeat:VIP):    Started iscsitgt01a.example.com
33670
33680        Daemon Status:
33690          corosync: active/disabled
33700          pacemaker: active/disabled
33710          pcsd: active/enabled
33720
33730    ○   Active 機で、設定変更を確認します。
33740
33750    a   diff <(grep -v last-lrm-refresh /etc/ha.d/crm.conf) <(sudo pcs config | grep -v last-lrm-refresh)
33760
33770    ○   Active 機と Stand-by 機で、状態を記録します。
33780
33790 a,s    sudo pcs status | sudo tee /etc/ha.d/crm.status
```

```
33800       Cluster name: iscsitgt01
33810       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
33820       Last updated: Sat Oct 29 18:33:24 2016          Last change: Sat Oct 29 18:33:24 2016 by root via crm_resource on iscsitgt01a.example.com
33830       Stack: corosync
33840       Current DC: iscsitgt01s.example.com (version 1.1.13-10.el7-44eb2dd) - partition with quorum
33850       2 nodes and 6 resources configured
33860
33870       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
33880
33890       Full list of resources:
33900
33910        Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
33920            Masters: [ iscsitgt01a.example.com ]
33930            Slaves: [ iscsitgt01s.example.com ]
33940        Resource Group: g_tgt
33950            p_lvm      (ocf::heartbeat:LVM):   Started iscsitgt01a.example.com
33960            p_lio      (ocf::heartbeat:LIO):   Started iscsitgt01a.example.com
33970            p_vip      (ocf::heartbeat:VIP):   Started iscsitgt01a.example.com
33980
33990       Daemon Status:
34000         corosync: active/disabled
34010         pacemaker: active/disabled
34020         pcsd: active/enabled
34030
34040 a,s    sudo cp -a /etc{,~}/ha.d/crm.status
34050
34060   ○    Active 機で、クラスタを停止します。
34070
34080    a   sudo pcs cluster stop --all
34090       10.110.88.57: Stopping Cluster (pacemaker)...
34100       10.110.88.58: Stopping Cluster (pacemaker)...
34110       10.110.88.58: Stopping Cluster (corosync)...
34120       10.110.88.57: Stopping Cluster (corosync)...
34130
34140   ○    Active 機と Stand-by 機で、再起動します。
34150
34160 a,s    sudo reboot
34170
34180   ○    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。
34190
```

```
34200   a   ssh admin@10.110.88.57
34210   a   admin@10.110.88.57's password: ********
34220
34230   s   ssh admin@10.110.88.58
34240   s   admin@10.110.88.58's password: ********
34250
34260   ○   Active 機で、クラスタを起動します。
34270
34280   a   sudo pcs cluster start --all
34290       10.110.88.57: Starting Cluster...
34300       10.110.88.58: Starting Cluster...
34310
34320   ○   Active 機で、状態を確認します。
34330
34340   a   sudo pcs status
34350       Cluster name: iscsitgt01
34360       WARNING: corosync and pacemaker node names do not match (IPs used in setup?)
34370       Last updated: Sat Oct 29 18:33:24 2016          Last change: Sat Oct 29 18:33:24 2016 by root via crm_resource on iscsitgt01a.example.com
34380       Stack: corosync
34390       Current DC: iscsitgt01s.example.com (version 1.1.13-10.el7-44eb2dd) - partition with quorum
34400       2 nodes and 6 resources configured
34410
34420       Online: [ iscsitgt01a.example.com iscsitgt01s.example.com ]
34430
34440       Full list of resources:
34450
34460        Master/Slave Set: ms_drbd_r0 [p_drbd_r0]
34470            Masters: [ iscsitgt01a.example.com ]
34480            Slaves: [ iscsitgt01s.example.com ]
34490        Resource Group: g_tgt
34500            p_lvm      (ocf::heartbeat:LVM):   Started iscsitgt01a.example.com
34510            p_lio      (ocf::heartbeat:LIO):   Started iscsitgt01a.example.com
34520            p_vip      (ocf::heartbeat:VIP):   Started iscsitgt01a.example.com
34530
34540       PCSD Status:
34550         iscsitgt01a.example.com (10.110.88.57): Online
34560         iscsitgt01s.example.com (10.110.88.58): Online
34570
34580       Daemon Status:
34590         corosync: active/disabled
```

```
34600           pacemaker: active/disabled
34610           pcsd: active/enabled
34620
```

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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