LVM逻辑卷配置过程详解

详细命令使用

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LVM分层结构图

LVM基本概念

物理存储介质（PhysicalStorageMedia）

指系统的物理存储设备：磁盘，如：/dev/hda、/dev/sda等，是存储系统最底层的存储单元。

物理卷（Physical Volume, PV）

指磁盘分区或从逻辑上与磁盘分区具有同样功能的设备（如RAID），是LVM的基本存储逻辑块，但和基本的物理存储介质（如分区、磁盘等）比较，却包含有与LVM相关的管理参数。

卷组（Volume Group, VG）

类似于非LVM系统中的物理磁盘，其由一个或多个物理卷PV组成。可以在卷组上创建一个或多个LV（逻辑卷）。

逻辑卷（Logical Volume, LV）

类似于非LVM系统中的磁盘分区，逻辑卷建立在卷组VG之上。在逻辑卷LV之上可以建立文件系统（比如/home或者/usr等）。

物理块（Physical Extent, PE）

每一个物理卷PV被划分为称为PE（Physical Extents）的基本单元，具有唯一编号的PE是可以被LVM寻址的最小单元。PE的大小是可配置的，默认为4MB。所以物理卷（PV）由大小等同的基本单元PE组成。

逻辑块（Logical Extent, LE）

逻辑卷LV也被划分为可被寻址的基本单位，称为LE。在同一个卷组中，LE的大小和PE是相同的，并且一一对应。

LVM管理命令：

pv(物理卷)的相关命令：

```
pvcreate: pv
pvs: pv
pvdisplay: pv
pvscan
    pvscan -e
    pvscan -n
    pvscan -s
    pvscan -u UUID
pvremove:
    pvremove /dev/sdd
pvmove: PE,.
    pvmove /dev/sdc
```

vg(卷组)的相关命令:

```
vgcreated :
        vgcreated vg0() /dev/sd{c,d,e}
    -s : PE
        vgcreated -s 16M vg1 /dev/sd{d,f,g}
vgextend:
        vgextend vg0 /dev/sd{c,e}
vgreduce:
        vgreduce vg0 /dev/sdc
vgremove:
        vgremove vg0
vgs :
vgdisplay: .
vgrename :
            verename vg0 lalala
vgchange :
            vgchange -a y|n(y:•n) vg0
vgexport
            vgexport vg0
vgimport
            vgexport vg0
```

lv(逻辑卷)的相关命令:

```
lvcreate:
    -n :
    -L :,,-L ##   ,-L +##
    -l :,PE.-l ##   ,-l +##
        %###free  %##vg
    -s
    -p  r
            lvcreate –s –n lv1_snapshot -L 10G /dev/vg0/lv0 -p r
lvextent
            lvextent –L +100G /dev/vg0/lv1
lvreduce
            lvreduce –L 17G /dev/vg0/lv0
lvrename
            lvrename /dev/lalala/lv0  lalala0
lvs: lv
lvdisplay : lv
lvremove
lvconvert
            lvconvert --merge  /dev/vg0/lv1_snapshot
```

实验操作

创建LVM分区并挂载

```
[root@localhost ~]# fdisk  /dev/sdb     ##
Welcome to fdisk (util-linux 2.23.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.
Device does not contain a recognized partition table
Building a new DOS disklabel with disk identifier 0x1e5372a5.
Command (m for help): m          ##
Command action
   a   toggle a bootable flag
   b   edit bsd disklabel
   c   toggle the dos compatibility flag
   d   delete a partition
   g   create a new empty GPT partition table
   G   create an IRIX (SGI) partition table
   l   list known partition types
   m   print this menu
   n   add a new partition
   o   create a new empty DOS partition table
   p   print the partition table
   q   quit without saving changes
   s   create a new empty Sun disklabel
   t   change a partition's system id
```

```
     u    change display/entry units
     v    verify the partition table
     w    write table to disk and exit
     x    extra functionality (experts only)
Command (m for help): n          ##
Partition type:
   p    primary (0 primary, 0 extended, 4 free)
   e    extended
Select (default p): p          ## p
Partition number (1-4, default 1): 1
First sector (2048-41943039, default 2048):    ##
Using default value 2048
Last sector, +sectors or +size{K,M,G} (2048-41943039, default 41943039):
##
Using default value 41943039
Partition 1 of type Linux and of size 20 GiB is set
Command (m for help): t          ## ID
Selected partition 1
Hex code (type L to list all codes): 8e     ## 8e
Changed type of partition 'Linux' to 'Linux LVM'
Command (m for help): w          ##
The partition table has been altered!
Calling ioctl() to re-read partition table.
Syncing disks.

[root@localhost ~]# pvcreate /dev/sdb1     ## PV
  Physical volume "/dev/sdb1" successfully created.
[root@localhost ~]# pvs          ## PV
  PV          VG Fmt  Attr PSize  PFree
  /dev/sda2   cl lvm2 a--  19.00g      0
  /dev/sdb1      lvm2 ---  20.00g 20.00g
[root@localhost ~]# vgcreate  VolGroup01 /dev/sdb1  ## VG
  Volume group "VolGroup01" successfully created
[root@localhost ~]# vgs          ## VG
  VG          #PV #LV #SN Attr    VSize  VFree
  VolGroup01   1    0    0 wz--n- 20.00g 20.00g
  cl           1    2    0 wz--n- 19.00g      0
[root@localhost ~]# lvcreate  -L 10 -n lvmServer VolGroup01    ## LVLV 10M
  Rounding up size to full physical extent 12.00 MiB
  Logical volume "lvmServer" created.
[root@localhost ~]# mkfs.ext4 /dev/VolGroup01/lvmServer     ## PVext4
mke2fs 1.42.9 (28-Dec-2013)
Filesystem label=
OS type: Linux
Block size=1024 (log=0)
Fragment size=1024 (log=0)
Stride=0 blocks, Stripe width=0 blocks
3072 inodes, 12288 blocks
614 blocks (5.00%) reserved for the super user
First data block=1
Maximum filesystem blocks=12582912
2 block groups
8192 blocks per group, 8192 fragments per group
```

```
1536 inodes per group
Superblock backups stored on blocks:
 8193
Allocating group tables: done
Writing inode tables: done
Creating journal (1024 blocks): done
Writing superblocks and filesystem accounting information: done
[root@localhost ~]# mkdir /data          ##
[root@localhost ~]# mount /dev/VolGroup01/lvmServer  /data/  ## PVdata
[root@localhost ~]# vi /etc/fstab        ## fstab
#
# /etc/fstab
# Created by anaconda on Sat Sep 29 14:06:28 2018
#
# Accessible filesystems, by reference, are maintained under '/dev/disk'
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info
#
/dev/mapper/cl-root      /                          xfs      defaults        0 0
UUID=377c18f4-a642-4659-80b0-ff4acffb0dbb /boot                       xfs
defaults        0 0
/dev/mapper/cl-swap     swap                        swap     defaults        0 0
/dev/VolGroup01/lvmServer /data  ext4 defaults 0 0

[root@localhost ~]# df -h         ##
Filesystem                     Size  Used Avail Use% Mounted on
/dev/mapper/cl-root             17G  2.8G   15G  17% /
devtmpfs                       226M     0  226M   0% /dev
tmpfs                          237M     0  237M   0% /dev/shm
tmpfs                          237M  4.7M  232M   2% /run
tmpfs                          237M     0  237M   0% /sys/fs/cgroup
/dev/sda1                     1014M  139M  876M  14% /boot
tmpfs                           48M     0   48M   0% /run/user/0
```

```
/dev/mapper/VolGroup01-lvmServer   11M  204K  9.6M   3% /data
```

扩容PV测试

```
## PVPV
[root@localhost ~]# cd /data/
[root@localhost data]# ls
lost+found
[root@localhost data]# vi lvm.test
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
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fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
[root@localhost data]# lvextend -L +1G  /dev/VolGroup01/lvmServer   ##
PV1G
  Size of logical volume VolGroup01/lvmServer changed from 12.00 MiB (3
extents) to 1.01 GiB (259 extents).
  Logical volume VolGroup01/lvmServer successfully resized.
[root@localhost data]# resize2fs  /dev/VolGroup01/lvmServer    ##
ext2\ext3\ext4
resize2fs 1.42.9 (28-Dec-2013)
```

```
Filesystem at /dev/VolGroup01/lvmServer is mounted on /data; on-line
resizing required
old_desc_blocks = 1, new_desc_blocks = 9
The filesystem on /dev/VolGroup01/lvmServer is now 1060864 blocks long.
[root@localhost data]# df -h          ## PV
Filesystem                    Size  Used Avail Use% Mounted on
/dev/mapper/cl-root            17G  2.8G   15G  17% /
devtmpfs                      226M     0  226M   0% /dev
tmpfs                         237M     0  237M   0% /dev/shm
tmpfs                         237M  4.7M  232M   2% /run
tmpfs                         237M     0  237M   0% /sys/fs/cgroup
/dev/sda1                    1014M  139M  876M  14% /boot
tmpfs                          48M     0   48M   0% /run/user/0
/dev/mapper/VolGroup01-lvmServer 1011M  973K  978M   1% /data
[root@localhost data]# cat lvm.test          ##
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
fdasfasfdmfasdads
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```
fdasfasfdmfasdads
fdasfasfdmfasdads
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```